BULLETIN
OF THE
AMERICAN GEOGRAPHICAL SOCIETY

Vol. XX 1888 No. 1

RUINS OF UXMAL, YUCATAN.
From "Les Anciennes Villes du Nouveau Monde."

ANNUAL ADDRESS

OF

CHAS. P. DALY, LL.D., PRESIDENT.

RECENT GEOGRAPHICAL WORK OF THE WORLD.

INTRODUCTION.

When I began, many years ago, to give, in an annual address, an account of the geographical work of the world, what was then done was so small, and the information to be obtained respecting it within a year was so limited, that I had to fill out my address with some other geographical subject.

In the course of time, however, the field of exploration became so great, and the amount of information to be obtained within a year so extensive, that I found it difficult to compress an adequate account of it within the narrow limits of such an address.

Minor details could be omitted when there was such geographical information to impart as was supplied by the Russian invasion of Eastern Asia, which made us acquainted with those long inaccessible cities of Bok-

hara and Samarcand, and those wild and conquering races that in the 12th and 14th centuries swept over Asia under Genghis Khan and Timour the Great, or where there was such a geographical event to describe as that wonderful descent of Stanley down the Congo, which revealed the course of that river and opened up Central Africa.

But such material is not to be found every year. There is a large amount of geographical work constantly going on; and however wide-spread and important it may be, the details of it are so very much alike that a complete enumeration of them would make such an address exceedingly monotonous. For this reason I have, for a few years past, devoted my address to other subjects; but in that interval so much has been done that is important and interesting, that I return with pleasure to a duty I discharged for so many years.

UNITED STATES.

I shall begin with an account of what has been done in our own country.

EXPLORATIONS IN ALASKA.

An expedition under Mr. W. H. Dall, so well known for his previous scientific researches in Alaska and the Aleutian Islands, established forty-two stations in Alaska for magnetic and astronomical observations, and settled the boundary line between the Russian and the American possessions, which line, as settled, passes through the Diomede Islands, in Behring Strait.

One of the remarkable discoveries was made in Kotzebue Sound. A mountain of ice from 600 to 800 feet

high, at a little distance inland, extended to Point Barrow. This great sheet of ice was covered with a non-conducting layer of moss and of vegetable mould, the clay of the period when the wild horse, the buffalo and the mammoth ranged over it; the bones of all of which animals were there found.

Lieut. Schwatka made a remarkable exploration of the Yukon River, in Alaska. He crossed with his party the Coast Range of Alaska to the head waters of the river, and there constructed a raft with which he boldly made the descent of this hitherto unknown stream for 1,500 miles—the longest voyage of this description ever made upon a raft. He surveyed the whole length of the river, which is more than 2,000 miles long, returning by sea to San Francisco.

A second expedition under the command of Schwatka was sent to Alaska in 1886 by the proprietors of the New York *Times*. The special object of this enterprise was the exploration of the Mt. St. Elias region. The results were the discovery of a river flowing from the base of the great mountain into Icy Bay. To this river was given the name of Jones, in honor of the patron of the expedition. It is claimed that this was not a discovery, and that the river was previously known. I shall not in this address enter into the dispute, but leave the river with the name that has been given to it. Several glaciers of great magnitude were also explored and named. An attempt was made to ascend the volcano; but, after reaching a height of 7,200 feet, the party found the obstacles insurmountable.

Another great river in Alaska was discovered and partly explored by Lieut. Stoney. It has been called

the Putnam, and empties into the Arctic Ocean, from which Lieut. Stoney entered it. For 300 miles from its mouth the stream was found to be broad and deep, and received many tributaries. After that distance Lieut. Stoney's further course was impeded by rapids. An attempt for seven days to haul their boats further up the river wore out his men, but the lieutenant, with two companions, made his way farther up, and found the river about the same as it was below the rapids.

Alaska appears to be as rich in glaciers as Switzerland. Mr. F. S. Wright has recently examined and described the most remarkable and the largest glacier yet discovered in the North-west. It is in Muir Inlet, from which it has been named. It is 250 feet high, and fills an amphitheatre more than 30 miles wide and of about the same breadth.

ARCTIC.

It will be sufficient, as I am in the region of the Arctic, simply to mention the Greely expedition and the rescue of its commander and survivors, for the Society gave General Greely and his companions a public reception, and is fully acquainted with the particulars of the expedition and its results.

The other Arctic expedition sent out at the same time under Lieut. Ray, to establish a Meteorological Station at Point Barrow, was more fortunate. A series of valuable observations was made; among others that there is no warm current running in this direction into the Arctic, and nothing to indicate the existence of an open Polar sea.

Geographical discoveries of importance were made by

Dr. Boas, a member of our society, in Baffin Land in 1883–1885. Dr. Boas rectified the line of the coast from Exeter Sound to the north, and the northern and eastern coasts of Cumberland Sound. He laid down correctly many of the islands, and devoted himself to a careful ethnological study of the Eskimos.

The suggestion made some years ago by Nordenskjöld that the interior of Greenland might be found upon investigation to be less desolate than was generally supposed, has not been confirmed by the results of recent explorations. Nordenskjöld himself in 1883 penetrated the country to a distance of 87 miles, and sent the Lapps of his party 143 miles farther, without finding any break in the great mass of snow and ice, which rose as the explorers advanced until it reached a height of 7000 feet.

Lieut. Peary, three years later, made a reconnoissance which confirmed Nordenskjöld's experience even more strongly, for he mounted 500 feet higher on the ice-cap than the Swedish explorer.

The effort to utilize Hudson Bay as a commercial highway to the north-west territory of the Dominion of Canada has not been successful. The result that has been found is that the passage through the 400 miles of Hudson Strait is never a safe one, even during the two or three months of the year when it is supposed to be open, and that a change in the wind may at any moment block it up with impenetrable ice.

COAST SURVEY.

A large amount of important geographical work has been done by the Coast Survey, which involves too

many details to be embodied in this address. A full account of it, for which I am indebted to the politeness of the superintendent, F. M. Thorn, Esq., will be published in connection with the Address in our Journal.

ANTIQUITY OF MAN IN AMERICA.

It has long been settled that North America, geologically, is the oldest of the continents. It has of late years been claimed by many American geologists that it was the first inhabited, or, at least, that the earliest remains of man have been found here. As all previous investigation by ethnologists, archæologists and historians has indicated that the earliest home of the human race was in the vicinity of the table-land of Central Asia, or in Asia Minor, this conclusion on the part of American geologists was not generally accepted, or, rather, to express it more correctly, was not thought worthy even of serious consideration. A very high authority, Mr. Alfred R. Wallace, who shares the honor of having announced contemporaneously with Darwin the discovery of the Darwinian theory of evolution, has carefully examined all the evidence relied upon by American geologists, and after a full and well-arranged statement of it, shows conclusively that man existed upon the American continent not only throughout the glacial period, when the northern part of America was covered by a great sheet of ice, but that he existed before it, in that period known to geologists as the Pliocene. It is now time, Mr. Wallace says, that the extreme scepticism that has existed on this subject should give way to an ever-increasing accumulation of facts. He especially dwells upon the fact that the Calaveras skull was

found in 1866, beneath four beds of lava, with a fifth bed of gravel on the surface, and upon the fragment of a human skull with the debris of a mastodon, that was taken out in 1857 from a shaft in Table Mountain in California, 180 feet below the surface; these fragments lying beneath a bed 3 feet thick of cement, together with fossil leaves and branches, over which were 70 feet of clay and gravel.

We have therefore the curious fact that what has been called The New World (America) is, geologically, the oldest, and was, as far as existing evidence shows, the earliest abode of the human race.

ANCIENT NORTH AMERICAN CITIES.

Mr. F. Cushing, who two years ago gave the Society an interesting account of Zuñi Land and its ruined cities and Pueblos, is at present at the head of the Hemenway expedition, which for several months has been engaged in excavating the ruins of an ancient city in Arizona, which is 3 miles long and 2 miles wide. He had previously found three other cities which constitute a part of a chain of cities that once covered what is now a desert. There are nineteen of these ruined cities in Salt River Valley alone, one of the smallest of which must have had a population of at least 10,000 persons. The people who lived in these cities, it is said, preceded the Aztecs, and had, to judge from the human remains and relics that have been found in the houses, a civilization which the explorers think as old or even older than the Egyptian Pyramids. Mr. Cushing says that the dwellers in these plains were Toltecs, an agricultural people, who had reached a high state of civilization

many centuries before the Aztecs appeared; that they were of Asiatic origin, but not a Mongolian race like the Indians of the Pacific coast, who were, he thinks, a later emigration. The soil and climate seem to have been the same as now, but a vast system of irrigation was required to make the land productive, for which ditches were dug. There were traced and laid out on the maps of the expedition, 300 miles of these ditches.

The population of one of the plains—that of Tempe, which had been highly cultivated, is estimated to have been 250,000. But this is only one place; similar indications of these ruined cities were found over adjoining mountains and through three successive valleys.

The chief food of the people was corn, which was very abundant. Their animal food was of the deer, the antelope and the rabbit; the remains of no other animal having been found. They had neither horses nor sheep. In the mountains the buildings were of stone instead of *adobe*, and the fields were divided by stone walls. Mr. Cushing thought these ruins extended as far as Utah and Southern Colorado, and as far east as the Rio Grande, and into Central Mexico. In the large city—"De los Muertos"—or the city of the dead, twenty-two large blocks of buildings have been explored, and three railroad car loads of relics taken from them have been sent to Boston. One of the buildings measured 400 by 375 feet. The buildings are two stories high, the entrance in some being through door-ways and in others through the roof. The roofs were of concrete, and most of them have fallen outward, indicating destruction by earthquakes; and that the cities were suddenly overthrown by a convulsion of this nature, appears by the

finding of skeletons under fallen roofs and timbers, in a position to indicate a sudden and violent death, and the large number of skeletons found shows that the destruction was sudden and wide-spread. The people that remained after these fields and cities were destroyed were made war upon by the wild tribes of the hills and forests. They were driven south into Mexico and beyond it, until every vestige, except these ruins of this remarkable and widely-spread pre-historic civilization passed away forever.

CENTRAL AMERICA.

CHARNAY'S EXPLORATION OF ANCIENT CITIES IN MEXICO, GUATEMALA AND YUCATAN.

M. Désiré Charnay, whose name is well known to the Society, resumed his exploration of the ruins of the ancient cities scattered through Mexico, Guatemala and Yucatan, and has embodied the result of his labors in a sumptuous volume, the interest of which is heightened by the manner in which the journey of the traveller is interwoven with the exploration and learned expositions of the archæologist; a book distinguished by the newness of the facts, the comprehensive grasp of the subject, and the charming style in which the narrative is written.

He describes a civilization, he says, long extinct, though not very old, and unknown, or rather misunderstood. He traces its origin on the high plateaux of Mexico to its highest development as it moved southward in the different parts of Central America; a civilization beginning with the Nahuas, a people of several tribes, of

which the Toltecs was the most endowed, a race intermingled with many foreign elements, people of the Antilles, Polynesians, Japanese, Chinese, Cochin Chinese, and Malays. He fixes this civilization as existing from the 7th to the 14th century. He thinks that the people from whom it emanated entered America by Behring Strait, after traversing Tartary, crossing the ocean on square rafts and large flat boats, called in the manuscripts sea houses, and then moving southward, founding their first city not very far from the present City of Mexico, and their second and more famous city near the north of the Gulf of California. He thinks that he has been able to fix the date of certain epochs and to establish some historical truths. He pays a high compliment to our countryman, Stephens, who preceded him in the exploration of Yucatan.

He believes that this civilization was mainly Toltec; that the Toltecs were the inventors of the hieroglyphics or written language by which they preserved their history on skins of animals, or on paper made of the maguey or palm tree, and were the inventors of many arts they are known to have possessed; that they were the great builders; and he finds an extraordinary resemblance between the sculptures at Angkor, in Cambodia, and the temple of Castillo, at Chichen-Itza, in Yucatan. The account he gives us of this people and of their great city, Tula, is most interesting; their pure manners, high morals, poetical feeling, and religious conception of a future life. He tells us that their principal god, Tlaloc, the god of rain and abundance, was a beneficent being, and worshipped by offerings of flowers and fruit; and that it was their successors who changed his worship into a

bloody sacrifice, instead of the gentle and poetical rites of this highly civilized and interesting people.

SOUTH AMERICA.

The French explorer, Dr. Crevaux, after geographical labor in the affluents of the Amazon and in Guiana, explored the Guaviare, a branch of the Orinoco, and descended the Orinoco to its mouth, where he passed some time studying the Indian tribes. In 1882 he went on an expedition to the Gran Chaco, where he and his party were massacred, near the mouth of the Pilcomayo, by the Toba Indians. M. Thouar organized an expedition to relieve the survivors, if there were any. He entered the Gran Chaco in the N. of the Argentine Republic, in the autumn of 1883, and reaching the spot where the massacre occurred, he found that the whole party had perished, and his own company was only saved from destruction by incessant vigilance. After several months of great hardship he reached Asuncion by way of the Pilcomayo River.

M. Wiener, the French Vice-Consul in Ecuador, passed through the Napo River to the Amazon, and so reached Brazil.

In 1885 M. Thouar was sent to study the Pilcomayo River, particularly with a view to its fitness as a waterway for commerce, and his report is that the river, with little trouble, could be made navigable.

The Gran Chaco he declares to be a healthy and fertile country, naturally divided into three zones: (1) that of the lowlands, near the streams; (2) that of a higher level, subject to overflow in great freshets, and (3) back of these the elevated plains, which are never submerged

by floods. The Pilcomayo banks are higher than the country behind them.

A most notable exploration in Brazil was that of the Xingú River by the German explorers Von Steinen and Claus. They started from Cuyabá, the chief town of Matto Grosso, a province more than four times as large as California, and descended the river to the estuary of the Amazon. Their observations established beyond a doubt that the whole of Brazil, south of the Amazon Valley, was once a great table-land, which has been undergoing denudation by water. The Matto Grosso region is of sandstone formation, with a mean elevation above the sea of 1475 feet. The chief commercial product of the Xingú is india-rubber.

The sources of the Orinoco, it is reported, have been reached within the past year by M. Chaffanjon. Some doubt still remains as to the fact, but it is certain that the mystery which has covered the origin of this mighty river will soon be dispelled.

The exploration of the southern end of the South American continent has been mainly the work of the Argentine Government. Mr. Moreno, under commission from his government, ascended the Rio Negro in Patagonia, and penetrated as far as the eastern slope of the Andes and the great lake, Nahuel-Huapi, which lies in the midst of mountains clad with birch and pine trees and abounding in glaciers. A later expedition established the fact that the waters of Lake Pirihuacá, which pass to the Pacific through the river Calle-Calle, have also an outlet to the Atlantic through the river Huahun.

Lieut.-Col. Fontana, Governor of the Chubut River territory, explored, in 1885 and 1886, the plains and the

slopes of the Andes. The aspect of the open country was desolate, but all the valleys were found to be covered with a rich vegetation. There were innumerable lakes, and streams of clear water, which were always in sight.

The French scientific expedition sent to Tierra del Fuego, in 1882, to observe the passage of Venus, made a number of hydrographical surveys and soundings in the archipelago.

A very interesting and valuable report upon Tierra del Fuego has been sent this year to the United States Government, by our Consul at Buenos Ayres, Mr. E. L. Baker, which shows that the general impression hitherto received respecting this region is unfounded; that it is a far better country than it has been represented, and is, especially the Argentine portion of it, largely capable of colonization and settlement. No country, says Mr. Baker, has ever been so persistently maligned and misrepresented, because those who visited its coast never penetrated into the interior, but drew their conclusions from what they saw or imagined they saw from their ships. Mr. Ramon Lista, who has travelled extensively in South America, and explored nearly all of Patagonia, says in respect to this part of Tierra del Fuego: "I have travelled from one extremity of the country to the other, and am scarcely able to credit what my astonished eyes have seen." Instead of the cold, bleak, and inhospitable country that it has been represented, he saw flowery plains of grasses capable of sustaining thousands of cattle and sheep, leagues upon leagues of rich valleys, accessible mountains, without snow, magnificent fruits, plants that in Buenos Ayres can be

grown only in a green-house, and nowhere had he received such profound emotions in the contemplation of natural scenery as in Tierra del Fuego. This statement, with what he says of the mildness of the climate, of its grassy valleys, rich pastures and virgin prairies, is indeed, geographically, a revelation.

AFRICA.

For the past few years Africa has been the part of the globe in which geographical exploration has been the most extensive and the most important. Beginning with the northern coast, a material fact to notice is the extension, in 1882, of a French protectorate over Tunis, which is, in fact, substantially taking possession of the country. Lieut.-Colonel Playfair, the British Consul General, who, in 1876, was the first person to pass through the Khoomir country, which was then a blank upon the maps, in 1884, eight years afterwards, visited the same region, passing over admirable carriage-roads, which were the work of the French. There is now a railway from Suk-Ahras, on the Algerian frontier, to Tunis, in which city good roads have been made and a new French city, alongside of the old one, is now springing up. Land is rapidly purchased for cultivation under the Torrens Act, by which it is said real property is as easily transferred as a bank share. The Roman remains throughout Tunis are being explored more effectually than has heretofore been done respecting remains of Roman civilization in Northern Africa.

In the years 1883 and 1884 Mr. de Foucaud made an extensive journey in Northern Africa. He traversed the Atlas range, passing along its whole length to the

Algerian frontier, a distance of 435 miles. Although the Atlas Mountains have been long known, they have never been fully explored, for he found the range flanked by parallel ranges that are not on any map. There is a chain 186 miles long, which lies north of the Atlas range, and south of it are the little Atlas and the Djebl-Bani ranges.

The Sahara Desert has recently been more accurately ascertained by a number of explorers. The mean elevation of this region is now known to be 1600 to 1650 feet above the level of the sea. A fifth part of it only has been found to be sandy, and chains of mountains, unknown before, have been discovered that are from 6000 to 8000 feet high. In some parts of it there is a rainy season, when the thermometer ranges from 122 Fah. to 19 degrees, and where the loftiest mountains are capped with ice for several months in the year, whilst in other portions of the Sahara rain falls only once in about 20 years. The whole area of this great region is now ascertained to be 3,700,000 square miles, which is about the size of the whole of Europe. Its entire population is now estimated at about 3,000,000, and there are towns containing from 5000 to 10,000 inhabitants, which is a much more favorable condition than has been supposed, as this whole space has hitherto been marked upon the maps as one vast desert.

The region between the rivers Senegal and the Niger for nearly 1000 miles in length has been surveyed, and the water-shed of the Senegal has been found to be near Bamaku, on the Niger, and all the rivers descending from it flow into the Senegal.

In 1887 the French commander in that region, Cap-

tain Gallieni, sent up the river Senegal a steamboat in parts, which was carried across the water-shed from the Senegal to Bamaku upon the Niger, where the boat was put together, and from there she went under the command of Lieut. Caron, up the Niger north to Kábara, which is the port of Timbuctoo. The unexpected appearance of this boat, moving without oars or sails, for a steamboat had never been there before, as the rapids and other obstructions on the Niger prevent the passage of vessels from the gulf, filled the people of Timbuctoo with amazement, none of whom had ever seen a steamboat, and few of them had ever heard of one.

This city was last visited in an overland journey across Morocco by the Austrian traveller, Dr. Lenz. He found it somewhat larger than it had been described by Barth, the German traveller, in 1854, but even now it is not remarkable in population, as it has but about 20,000 inhabitants. It will be remembered that the wealthy Dutch lady, Miss Tinne, who became distinguished as a geographical explorer in Borneo and in Africa, was killed near this city. Dr. Lenz saw one of the party by whom she was murdered. He was also told that some of the effects of Col. Laing, who had been killed in this part of Africa more than 50 years ago, were still preserved. Col. Gallieni has reported that the country of the upper Gambia and its affluents has now been surveyed, and that, by a treaty made with the Almamy Samory, a French protectorate has been extended along the right bank of the Niger from Segu to the boundaries of Liberia and Sierra Leone.

The sources of the Niger were discovered in 1879 by the French explorers Zweifel and Moustier, in the hills

near Nelia, about 200 miles east of Freetown, the capital of Sierra Leone. The course of this great river is north-north-east, to Timbuctoo, when it turns to the east, then to the south, south-east, and finally south to its mouth in the Gulf of Guinea. The country enclosed between the river and the gulf is almost wholly unknown.

Germany, as will more fully appear hereafter, has become a great colonizing power in Africa. She has annexed in part what is known as the Cameroon region, on the west coast; and through her possessions on the Gulf of Guinea she is now reaching inward for the trade of the Soudan and the country about Lake Tchad.

The Cameroon region has considerable elevation at a short distance from the sea. The chain known as the Cameroon Mountains reaches to an altitude of more than 10,000 feet. At the height of 3,000 feet the palm tree ceases and is succeeded by tree ferns, until at 8,000 feet the wood belt ceases altogether. At the height of 12,000 feet on the Cameroon Peak, Mr. Grenfell, the English missionary, found that the thermometer marked in the month of March 47° Fah. The country is in most places exceedingly fertile and is capable of great development, to which those native organizations known as Secret Societies are strongly opposed; and as the influence of these Societies over the chiefs and kings is very great, they may interpose serious obstacles to the development of this part of Africa.

It is very evident that the creation of the Congo Free State, which dates only from 1885, and embraces a great portion of the valley of that river, has been an

important factor in the civilization of Africa, as it has undoubtedly stimulated the Portuguese and other powers having African territory to greater exertions. It has roused the colonizing instinct in nations hitherto indifferent to efforts of that kind. Germany has already withdrawn the large fund which was annually devoted to geographical exploration, that it might be applied exclusively towards the successful colonization of the portions of Africa of which she has taken possession.

What has been done in the region of the Congo in three years is wonderful. The river has been carefully traced from Lake Tanganyika, in the east, and along its northern curve to the Equator, and thence south-westerly, until it discharges itself into the Atlantic. The greater part of the valley of this great river, with its subordinate valleys of the Ubangi on the north and the Kassai on the south, is full of streams and capable of extensive cultivation. Along the river many stations have been founded, which are likely to grow into extensive centres of civilization, and the activity of explorers, English, French, German, Swedish, and Austrian, has been unremitting.

An English engineer, who has furnished a very valuable paper in a recent number of *Blackwood's Magazine*, confirms the statement of Stanley that the country in the interior is far healthier than the coast, and that with ordinary care it is not more injurious than the climate of the island of Jamaica or of Singapore.

The climate, he says, is blamed for fevers and other diseases which are brought on by the follies and carelessness of the new-comers, and that the fevers of the country are not dangerous if treated in time, and can

generally be avoided by care. When the country, he says, is more opened up, and Europeans are able to bring out home comforts, they will be able to live there with as much ease and safety as they now do in India.

The effort of the King of the Belgians in maintaining the organization and the keeping up of a central route as a means of communication from the west to the east coast, has added greatly to our information of the extensive region through which the Congo flows. Steamers now run on the upper Congo from Stanley Pool to Yellala Falls, where the lower Congo begins. For 230 miles this great river is unavailable for the purposes of navigation. Over this long distance merchandise has to be carried by porters, marching in Indian file through a pathway about 9 inches wide, bounded on either side by a dense jungle of cane-like grass, which is never lower than the shoulder. Over this unavailable space for navigation a railway is now contemplated, and when this is accomplished a great change in the whole of Central Africa will follow.

Lieut. Wissman has made a second journey across Africa. He started in October, 1886, from Luluaburg, a station of the Congo Association, in the empire of the Muata Yambo. He had wished to explore the country to the north-east of the Lubi River, but he found the state of things so much changed since his former visit, four years ago, that he was unable to carry out his project. Formerly the cowrie was the principal object of barter, but now guns and ammunition were what was demanded. The slave trade was flourishing on the Lukassi River. He was attacked and several of his party were killed by poisoned arrows. The land of the

industrious Beneki, whom he visited on his first journey. he found entirely devastated. He crossed a country depopulated by war and by small-pox. His own followers were stricken by the disease, and the party suffered for want of food. When he reached Nyangwe he found the Arabs in great excitement over the capture of Stanley Falls Station. From there he sent back the Bassilonge who were with him, and continued on his route to Zanzibar, whence he returned to Europe.

The results of this expedition are not so important as it was hoped they would be. What was wanted was a more thorough knowledge of the hydrography of Central Africa, to which the expedition, for the causes above stated, can have contributed but little.

The Kalahari desert of Southern Africa is by no means an uninhabited waste. The estimate of its size varies from an area equal to that of Texas to one of twice that extent. The Orange River forms its southern boundary, and it is partly watered by eight or ten rivers on the east, and by Lake Ngami. The small streams which feed these rivers, overflowing in certain places, create marshes; but the land is generally elevated, the central water-shed being over 4000 feet in height at a point where Mr. A. A. Anderson, who has studied the desert for many years, ceased his explorations.

Coming to the east coast of Africa, the first fact to be noticed is the signal success on the part of the Portuguese in Mozambique, a colony that for more than forty years has been harassed by the depredations of a chief named Bonga, who controlled the Zambesi between Tete and the sea. The stronghold of this robber chief and

all of his fortified villages were captured recently and his mastery over a river so important as the Zambesi has now wholly ceased.

The Congo Free State has made no effort to extend its authority between Lake Tanganyika and the Indian Ocean, for Germany has practically annexed, under the name of a protectorate, the whole of the territory, of undefined extent, but which is estimated at 150,000 square miles, lying between Lake Tanganyika and the main land of the Sultanate of Zanzibar, which embraces Dar-es-Salam, one of the finest harbors on the Indian Ocean. Stations have been already established on the roads leading inland to Massai Land and around Mount Kilimanjaro, the highest mountain in Africa. This great mountain, which lies about three degrees below the equator, in the range of mountains that stretch from the Victoria Nyanza to the ocean, is 20,000 feet in height. It was first discovered by the missionary, Rebman, nearly forty years ago. It has since been visited by many travellers who have attempted unsuccessfully to climb it; but Dr. Meyer, it appears from recent information, succeeded in attaining to within 200 feet of the top of Kibo, the higher of the two peaks.

Like many of the Mexican and South American mountains, Kilimanjaro presents every variety of climate and nearly every form of vegetation, from the plants of the Torrid Zone to those of the Arctic.

Farther to the south and west the new German territory is bounded by Lakes Tanganyika and Nyassa, and in this way the colony will have an outlet into the great basins of the Nile, the Congo and the Zambesi. The whole region is remarkably fertile, so far as known. The

climate is favorable to the white man, and it is a subject of general congratulation that the development of this large and important region of Africa has passed into the hands of the Germans.

Immediately north of this German Protectorate lies a somewhat smaller protectorate, which is recognized as English, and which has heretofore been as little known as Kilimanjaro.

The line claimed by the English runs north-west to the Victoria Nyanza, and across the mountain range. Almost under the equator stands Kenia, the second in height of the African peaks. The mountain, as seen and described by Mr. Joseph Thompson, appears to be more impressive even than Kilimanjaro. Mr. Thompson says Kenia rises as a great volcanic cone, nearly 30 miles in diameter at its base, from an elevated, thorn-clad plain, 5700 feet above the sea, to an altitude of 15,000 feet. He says the angle of the mountain is very low with a slope comparatively unbroken by ridge or glen. From that height of 15,000 feet the mountain suddenly springs up 3000 feet in a sugar-loaf peak, the resemblance to a sugar-loaf being made the more striking by the glittering facets of snow which characterize this peak.

Just north of the English Protectorate lies Vitu, a German colony, at the lower limit of the vast region known as Somali Land, a land which stretches north-east to Cape Guardafui, and thence west to the Gulf of Tanjarah. The limits of the interior of Somali Land are somewhat undefined, but it would seem to be as large as France. It is inhabited by the Somali and Galla races, which are divided into many tribes, who are so war-

like that they are not often at peace among themselves, and so aggressive to strangers as to make the exploration of Somali Land exceedingly dangerous. The Gallas, living more to the west, have crossed into Abyssinia and established themselves there. Not only are the tribes hostile to strangers, but the country itself is difficult of access. A journey from Zeila, on the Gulf of Aden, to the Harar, a distance of 185 miles, gives a very good idea of the general nature of this land. The first 50 miles is over a sandy plain, without water, after which the road is up the beds of rivers, across mountains and through deep ravines. Here are vast tracts of stony plains, supposed to be impassable, and from the warlike character of the savages who inhabit this region, and the nature of the country itself, it may be a long time before we shall have anything more than a fragmentary knowledge of this great peninsula.

The exploration of the interior has been actively undertaken by Italian travellers, of whose explorations and journeys I have given an account in previous addresses. The efforts of these Italian explorers may be briefly summed up in the short statement that they have displayed the highest heroism, with the most devoted perseverance, and have added many to the long list of those who have succumbed to disease or lost their lives by violence, in the effort to penetrate and civilize this vast continent.

In Egypt, now under British control, the labors of travel and exploration have been confined to the better known portions of the country, and have been necessarily archæological in their character.

During the past year, however, Prof. Ascherson made

some investigations in the Delta of the Nile, east of the Rosetta branch. He visited the coast lake, Burlus, which he calls Brullus. It abounds in salt-water fish, and the district contains 100 settlements and about 15,000 people. The town Burlus, marked on the maps, does not exist, and the cartography of the district was found to be in need of correction.

Prof. Ascherson then proceeded to the Suez Canal and followed the Syrian caravan route to El-Arish. The country east of the canal is rich in vegetation, and the rain-fall in winter is not inconsiderable. There were heavy showers on April 30th and May 1st, which is noticeable, as Egypt is supposed to be rainless. Fair hair and blue eyes were not uncommon among the inhabitants, who were a mixture of Arabs, Syrians and Turks.

The Raïan basin of the Nile, explored and surveyed by Cope Whitehouse, is found to be adapted to the formation of a storage reservoir for the waters of the Nile; and the English engineers strongly urge the undertaking of an enterprise for the purpose.

Both Emin Pasha's geographical work in the Egyptian provinces, and the Congo Free State, are but the realization of Gordon's idea that the civilization of Africa could only be worked out by attacking and suppressing the slave trade from within as well as from without.

The possession of the sea-coast by the European Powers will cut off the foreign market for slaves, and it is hoped put an end to this traffic, which is now desolating the healthy regions of the interior, for on its suppression depends the future civilization of Central Africa.

EARTHQUAKES AND VOLCANIC ERUPTIONS.

The changes made upon the earth's surface by the effects of earthquakes and volcanoes may be embraced in this enquiry, as they are a part of the geographical work of nature. As the disturbance of the earth's surface by earthquake-shocks and the breaking forth of subterranean forces in volcanoes have, during the period covered by this address, been so extensive and so widespread, a very brief enumeration of them may be offered to show how much takes place in this way in a very limited space of time.

In 1880 there were thirty earthquakes, and in 1881, twenty, the most serious of which was at Casamicciola, upon the island of Ischia, in the Bay of Naples, which destroyed the upper end of the town : by which one hundred persons were killed. This is supposed to have been caused by the sinking of the soil.

In 1882 there were fourteen earthquakes in Europe, Asia and America, and seventy-four in Japan, where Professor Milne says there is an earthquake every day in the year. There was a severe one that year at Fayal, in the Azore Islands, and a severe one at Panama. In 1883 many shocks were felt in Andalusia and Murcïa, in Spain, and along the Mediterranean to the Balkan region. In 1884 there was one in England, with great damage to buildings and some loss of life. Thirty-four slight ones were reported that year from various places, thirty of which were in Japan. Upon Christmas night of that year violent shocks were felt in Austria, in Italy, and especially in Southern Spain. At Arenas del Rey 500 persons were killed or injured, and others in many towns along the coast. At Alhama, the upper town,

which was on a hill, was thrown upon the lower town, and 1500 houses were crushed. The area chiefly affected was between Cadiz and Cape Gata, and from Malaga to the Carpetana chain. At Güevejar a fissure opened in the earth which split an olive tree in the centre from root to branches, leaving half of the tree hanging on one side of the cleft and half on the other. A remarkable earthquake in 1886 was the one in Charleston, South Carolina, the shock of which was felt from the Gulf of Mexico to the great lakes, and from the Atlantic to the Mississippi River. The natural phenomena connected with the Charleston earthquake were curious fissures opened, often of great length, sulphurous fumes emitted, sand, red and white, thrown up, and brackish, tepid water spouted out.

In January, of last year, an unusually violent earthquake near Tokio, in Japan, was felt over 32,000 square miles.

One of the most remarkable volcanic eruptions known in the history of the world occurred in 1883, in the volcanic island of Krakatau, in the Strait of Sunda, which separates the island of Sumatra from Java. The volcano was supposed to be extinct, but on the 20th of May an eruption began, which lasted several days. A white column of vapor, enclosing dark clouds, rose to the great height of 36,000 feet. The eruption continued from the 22d to the 23d of May, and from the 25th to the 28th of August following; the latter being the most severe. The disturbance was accompanied by great tidal waves, which, at Merak, rose to a height of 90 feet, and swept the whole coast up to the hills. In Merak only one person was left alive. There were

three tidal waves, the last carrying off all that was left by the two preceding. The devastation was terrible, both on the Sumatra and the Java sides of the strait. Whole villages were destroyed; explosion followed explosion, with a rain of ashes continually. The distance at which the noise of the eruption was heard surpasses anything previously known. The report was heard in every island of the Archipelago, including the Philippines. Taking the volcano as a centre, the sounds were propagated in a circle, having a diameter of 4142 miles, and the area enclosed within this circle was equal to one-fifteenth of the earth's surface. The very fine ashes carried up into the air changed the appearance of the sun as seen at Japan, in places on the Mediterranean and on the Pacific Ocean. The ocean wave extended 6685 nautical miles, and what is most remarkable, there was not the least mark of upheaval discovered either at the bottom of the sea or on the coast.

ASIA.

The Russian scientist, Konschin, made a journey east of the Caspian and north-east of Turkistan, embracing the Kara Koom desert and the Attak oasis, a region of vast sands and salt deserts. The Kara Koom desert, he thought, was a part of the old Aral basin in which he saw evidence of great geological change. He found that the Kara Koom desert retained traces of marine fauna. The eastern part of it, which consists of dried-up lakes, is the oldest, and has a line of hills that mark the ancient shores of the Caspian Sea. The conversion of the desert into sand, he thought, was owing to upheaval and the polar winds.

Bonvalot and Capus, the French travellers, passed two years in exploring the region of the river Oxus. They descended the Oxus and found ruins of towns dating back to the time when the river flowed into the Caspian Sea.

OXUS.

A bridge over this river near Charjui, more than two miles in length, has recently been constructed, and two Russian steamers have been launched upon the historic river and now run regularly upon it. The erection of this bridge over the Oxus and the completion of the railroad to Samarcand will no doubt be followed on the part of the Russians by the annexation of Bokhara, and Russian dominion will thus be secured from the base of the Caspian to this important part of Turkistan.

The Russian traveller, Sevastof, examined the famous region of the Pamir. He says it is not a table-land, and that it has no steppes up to 12,000 feet. The valleys are about 13 miles wide, and the mountains are 7000 feet above the valleys. Three of the mountains rise to a height of 25,000 feet.

Prejevalsky, the Russian explorer, whose previous geographical labors in this part of Asia I have frequently mentioned, crossed the Gobi desert to Alachan, in Mongolia, and so into Northern Thibet, where he found men working in gold mines, and he thought this part of Thibet richer in gold than California. He reached the Koko Nor lake, which is 15,700 feet above the level of the sea, and is 170 miles in circumference. He found it frozen at the end of April. West of the lake was a great salt marsh, 500 miles long and 70 miles wide, and on the plateau upheld by the great mountain,

which was over 17,000 feet high, he found the sources of the celebrated Chinese rivers, the Hoang-Ho and the Yang-tze-Kiang. He reached the source of the Hoang-Ho, which he found to be 13,600 feet high, and the water-shed between the two rivers was 1000 feet high. The climate was terrible at the end of May. The region is wild and forbidding, so that the nomadic tribes will not stay, and yet it abounds in wild animals.

The well-known Russian traveller, Potanin, in 1883 and 1884, with Skassy and Berezovski, accompanied by Madame Potanin, who rendered valuable aid, made a journey of exploration in China and Mongolia, starting from Pekin. To give an account of this journey would require the constant mention of Chinese names which would not indicate the journey, without a much fuller map than it is possible to display upon this platform. It must suffice, therefore, to say that it was over great plains and high plateaux, following up and crossing labyrinths of steep mountains cut in nearly every direction by narrow valleys, which are the sources of great rivers. On the plain of Ordos, in Mongolia, which is bounded on three sides by the bending of the Hoang-Ho, or Yellow River, and on the fourth by the mountains that divide the plain from China proper, they saw a felt tent, in which, it was said, were kept the bones of Genghis Khan, who died here. Legends respecting him abounded everywhere about. It was believed that his body was enclosed in a silver coffin with an outer case of wood, under a canopy of silk. Members of his family lie buried around him for a distance of 3 miles. It is believed that every evening a sheep and a horse are offered up to the spirit of the great Asiatic conqueror,

or, as he is called, "The Supreme Sovereign." The people declare that the voices of the Chinese he had slain are heard around at night, with other sounds and sights, as Milton expresses it,

> "—— airy shapes that syllable men's names
> In sands and wastes and desert wildernesses."

It is a tradition that the long sand dunes which exist there were thrown up as ramparts by Genghis to turn the course of the Yellow River. Wild as the region was, they found the remains of great cities, one of which, 20 miles south of the Hoang-Ho, had walls that measured nearly 5 miles on a side. At Lan Chu they found the country one vast garden. Here they separated, and Potanin went up the Hoang-Ho to its sources.

A pundit, A——k, of the Indian Survey, made a four years' journey through Great Thibet to the north and east over a vast region almost wholly unknown. With a rosary to count his paces, a prayer-book, and speaking Thibetan, he crossed the Himalayas, entering Thibet, and found his way to Lassa, where he was detained a year; but where, however, he was not idle, for he made a survey of this celebrated but little-known city, the Rome of Thibet, which is crowded with temples and religious edifices.

After this he went with a caravan north-easterly to Mongolia, crossing the great plain of Thibet, called Chang Tong, or the Northern Plain. Over this plain he passed a cultivated country, with fixed habitations; then a pastoral land of 180 miles of wandering encampments, where he counted over 7000 tents. The remaining 240 miles of Chang Tong he found uninhabited, and

abandoned to wild animals. The highest pass crossed was the Donga range, 16,400 feet, which is the water parting between the Yang-tze-Kiang and the Mekong of Cambodia. He descended to a level of 9000 feet, where he found a comparatively warm region, with abundant forests and cultivation, thus reaching the border-land between Thibet and China. He passed through Lithang, one of the highest cities of the world, at an altitude of over 13,000 feet, (about the height of Potosi, in Bolivia, which is 13,649,) and which, though at the very extremity of respirable atmosphere, had at one time a population of 150,000. He found that the Sangpo River merges into the Bramapootra, as Colonel Yule and other geographers have maintained, and in November, 1882, he completed the arduous journey of 2,800 miles through a nearly unknown country. He succeeded in keeping up an unbroken route survey, with magnetic bearings, bringing back with him all his field-books, after exploring regions which Englishmen, Russians and Hungarians have heretofore attempted in vain.

THE HOANG-HO.

A remarkable event occurred during the present year in North-eastern China. The Hoang-Ho, or Yellow River, is one of the great rivers of the world, and also one of the most devious, running over its long course of 2700 miles in every direction, north, south, east, and west. It is also the most turbulent and impetuous of rivers, sometimes changing its bed and finding a new mouth far from the former one, and at others expanding into vast and destructive floods. Its source has recently been accurately ascertained, as I have said, by Mr. Pota-

nin, who found that it rises in the Amdo plateau of North-eastern Thibet. Previous to 1853 the river descended from the north and ran almost directly south for about 500 miles, where it made a bend, and entering the great plain of Northern China ran almost due east for about 650 miles to the Yellow Sea, where it formed a large mouth or estuary. In 1853, in the mountainous region where the river takes its rise, at an elevation of nearly 12,000 feet, the accumulation of snow was so great, and the melting of it so rapid, as to largely swell the volume of water in the river, which, augmented by the autumnal rains, became so powerful that beyond the great bend, near Kai-fung-Fu, where the country is low and flat, the river burst its northern bank, and, passing through the opening thus made, found its way in a north-easterly direction to the Gulf of Pechili, 500 miles from its former mouth.

This catastrophe was attended by wide-spread destruction, for the country through which the river rushed in its new course was one of the most fertile and thickly populated in China. The destruction of property and of human life was very great; and now, after 35 years, and after the country thus devastated had recovered from the disaster that befell it, the accursed river, as the Chinese call it, burst through its southern bank near Kai-fung-Fu, which is a little above the place where the former disaster occurred; the volume and force of the water being so great as to make an opening or gap four miles wide, where a moving mass of water, 12 feet high, rushed through, and, spreading in every direction, brought ruin and desolation over what had been before a most fertile and highly cultivated country.

The disaster has been so recent that we do not yet know its full effect; whether from the nature of the country the waters have formed a huge lake into which the river will hereafter run, as the Volga into the Caspian, or the Oxus into the Sea of Aral, or whether, following a channel or bed, they may, as before, find their way as a continuous river to the Yellow Sea. As the country is low and flat, the latter result appears the more probable.

It has been said that the Chinese dread this river more than war, pestilence, and famine. One of their emperors declared that looking after it gave him more anxiety than the government of the whole kingdom. Their records show that during the past 2500 years the river, below Kai-fung-Fu, the scene of the present disaster, has changed its course and found a new mouth no less than nine times. The geographical phenomenon of rivers changing their beds and forming new outlets has taken place in other countries, especially in Spain; but nothing on a scale of such magnitude as the changes of the Hoang-Ho has occurred in the past history of the world.

In 1883 Mr. Colquhoun, at the head of the Wahab Expedition, made a journey from Canton through the province of Yunnan, in China, the most broken and moutainous peopled country in the world, and thence across China to Bhamo, in Northern Burmah. It was a most difficult and exhausting journey, over roads terribly bad, food being poor and scarce, except in the towns; the inns miserable. Along the route they found traces of the great rebellion in very numerous ruined villages, and other evidences of a past prosperity. Two

thousand miles of the route were surveyed, embracing the whole of Southern Yunnan, along a route of great importance, hitherto untrodden except by the Chinese. Their way was very much obstructed by officials and others, but the aboriginal people were found kind and hospitable.

M. D'Angis ascended the Hai-Ho, or Black River, in an attempt to reach Yunnan in South-west China, and the river was found to be impeded by 54 rapids.

Mr. Boulangier made a journey in Siam and Cambodia. He found that Upper Cambodia was a fertile country, and that Lower Cambodia was under water during four months of the year, so that the raising of rice is alone profitable.

The occupation of Cochin China by the French has resulted in a material change in the political geography of this part of South-eastern Asia. They extended a protectorate over Annam, the long and narrow country lying between Siam, the Shan States, and the ocean, and afterwards conquered Tonquin, lying between Annam and China, with the declared object of finding a commercial entrance into the rich Chinese province of Yunnan, by water, along the Song-tai River, which runs through Tonquin to the Gulf of Tonquin, in the China Sea, and they have now extended a protectorate over Cambodia, with a design of forming a French Indo-Chinese Empire. The character of the people of Annam and Tonquin, already debased by vices and bad habits, has not been improved by their contact with the French.

BABYLONIAN RECORDS.

Before mentioning the travels and explorations of M.

and Madame Dieulafoy in Northern Persia, which have an interest alike geographical and archæological, and with which I shall close my address, I may mention that the explorations upon the sites of Nineveh and Babylon have brought to light information showing that many things supposed to have come into use after the Middle Ages are of remote antiquity. M. Revillout, from the study of the clay tablets, or bricks, as they are called, has found that the Chaldeans had banks where the depositor could open a credit, drawing upon what he had in the bank, as in modern times, by a check. He could either open a credit with a bank, or deposit his capital there for security. Mortgages were extensively in use among the Babylonians, drawing an annual rate of interest. Guardians were appointed for minors or married women, whose parents were dead. Prisoners were released from confinement upon giving bail, that is, upon their friends giving security for their appearance, and associations were formed for the carrying on of a business either as partnerships, or somewhat in the nature of our modern corporations. Truly it may be said with Solomon, there is nothing new under the sun.

PERSIA.

The French Minister of Public Instruction sent M. and Madame Dieulafoy, with Babin and Houssay, to make excavations at Susa, the Biblical Shushan, the Palace, as it is called in Scripture, and to secure for the museum of the Louvre what antiquities might be found. Mme. Dieulafoy, who went with the expedition, displayed a courage, zeal and energy so extraordinary that the Government made a special recognition of her services.

The collections made for the museum weighed in all something like 60 tons, and these had to be transported from Susa to Bassora, a distance of 250 miles across a desert country.

With this expedition to Persia, one of the early seats of human civilization, I may appropriately bring to a close this account of the recent geographical work of the world.

U. S. COAST AND GEODETIC SURVEY.*

Among the contributions of value made to geographical knowledge in the progress of the work of the Coast and Geodetic Survey up to the close of the past year may be enumerated the following :

Upon the Atlantic and Gulf coasts the triangulation intended to define accurately the coast line, and to determine in geographical position all important harbors, landmarks and aids to commerce and navigation has been nearly completed. Short gaps remain to be filled upon the coasts of North Carolina, Alabama and Louisiana, and work upon two of these is now in progress. Triangulation of outer coast line is entirely completed from Maine to Texas, except two or three bases of verification being measured the present winter. The points referred to in North Carolina, Alabama and Louisiana are simply bays and harbors. As soon as appropriations become available, certain connections of the main triangulation along the Appalachian chain with the coast triangulation must be made, and the triangulations on the east and west coasts of the peninsula of Florida must be united on a line from Fernandina to Cedar Keys. For the purposes of geodesy it will be of interest to know that an oblique arc of the meridian, carried by the primary triangulation from Calais, Maine, to Atlanta, Georgia, a distance of some 1,200 statute miles, has been completed nearly to Montgomery, Alabama, and that operations are now in hand for extending this arc to the Gulf Coast at Mobile, thus securing the measurement of an oblique arc of twenty-two degrees.

Upon the Pacific coast the triangulation has covered all of the more important harbors and anchorages between San Diego and the Gulf of Georgia, and has made progress in South-eastern Alaska.

The topography, which by the organic law of the survey is executed for purposes of commerce and defence, has followed closely and nearly kept pace with the advance of the triangulation upon the Atlantic and Gulf coasts. Excepting the topography of rivers to the head of ship navigation, it may be said to be practically continuous on these coasts from Passamaquoddy Bay to the Rio Grande, the only gaps remaining to be filled being at the north-eastern extremity of the coast of Maine ; on the west coast of Florida, between Cape Sable and Cape Romano ; at

* For these notes I am indebted to the kindness and courtesy of F. M. Thorn, Esq., the Superintendent of the United States Coast and Geodetic Survey. C. P. D.

Perdido Bay; at Atchafalaya River and Grand Bay, and on the coast of Texas, between Sabine Pass and Vermilion Bay.

In all of the more important localities on the Pacific coast the topography has been finished. On the coast of California it has been completed from San Diego to Trinidad Head, with the exception of two gaps. On the coast of Oregon a number of gaps are yet to be filled, mainly of stretches of coast where no harbors exist. The topographical surveys in Alaska have been of a preliminary nature.

In the interior States no opportunity has been lost of extending the determinations of geographical position under the law providing for a geodetic connection between the Atlantic and Pacific coasts. This connection, which is being carried across the continent by a belt of primary triangulation near the 39° parallel, is now about two-thirds completed. The elevated peaks of the Coast Range and of the Sierra Nevada, in California and Nevada, and those of the Rocky Mountains in Utah, have helped to carry long lines of primary triangulation, advancing eastward to connect with similar triangulation proceeding westward from the Atlantic coast. Recent primary triangulation in Utah has developed, as a part of this scheme, four lines ranging in length from 140 to 150 miles, between mountain peaks ranging in elevation from 11,800 to 13,100 feet. The advance of this triangulation, with the continuation and extension of that in the several States which have made provisions for their own topographical and geological surveys, is gradually providing a basis upon which the States interested can make trustworthy State maps.

Not a few inquiries of scientific value have light thrown upon them in the course of the occupation of elevated mountain peaks for geodetic work; among these there is the effect of mountain masses upon the direction of the vertical. Special attention was given to this subject in the course of the year by an officer of the Survey detailed for duty with the Hawaiian Government Survey, at the expense of the latter. Determinations of latitude and gravity upon the Hawaiian Islands were made under conditions exceptionally favorable for observing changes in the direction of the vertical dependent upon the great depth of the sea, the volcanic formation of the mountains, and their distance from the masses of the continent. At Kahuku, on the windward side of Oahu, preliminary reductions have shown a difference between the astronomical and geodetic latitudes of nearly a minute of arc, one of the most striking examples in the world of deflection of the plumb-line from mountain attraction.

The hydrographic work of the Survey is now practically complete upon the Atlantic and Gulf coasts; the only gaps remaining to be filled being in Cobscook Bay, Maine; off the west coast of Florida, and on the Gulf coast west of the Passes of the Mississippi. Upon the Pacific coast all of the chief harbors, anchorages and roadsteads, with their approaches, have had their hydrography finished; the stretches of coast that yet remain are those where the interests of commerce and navigation are of least importance. But the effort is to finish these also as soon as practicable. Hydrographic work in South-eastern Alaska has been pushed with great energy; during the past year an area of 1,600 square miles was covered, and over 17,500 miles of soundings were run by the combined parties, the localities being Clarence and Sumner and Wrangell Straits.

In the domain of physical hydrography the most notable researches were those which led to the announcement of the laws of the circulation of the sea through New York Harbor (Appendix No. 13, 1886) and the observations of currents in the Gulf Stream, carried on with apparatus specially devised for the purpose and perfected by trial during several seasons of Gulf Stream exploration. (Appendices 14, 1885; 11, 1886, and 8, 1887.) During the past season observations of currents were made upon lines crossing the Stream, or normal to its course, between Rebecca Shoal and Cuba; between Cape San Antonio, Cuba, and Yucatan, and from Cape Hatteras Shoal south-east, currents being observed at a number of stations on these lines at much greater depth than ever before attempted, the steamer being safely anchored at each station. The greatest depth of anchorage was in 1,852 fathoms, off Cape Hatteras, and that, too, with a surface current of over four knots.

It is anticipated that one result of these investigations, if the means afforded of prosecuting them are continued, will be to ascertain the effect of the tides upon the currents of the Gulf Stream, and supply the mariner with tables predicting these effects and the amount of daily variation in the current, its depth and velocity at different depths. A notice to mariners embodying such predictions has, in fact, already been issued from the Coast Survey Office, which now issues a monthly notice to mariners, covering all dangers, changes, etc., developed since the last previous notice. The Survey is now issuing, gratuitously, Index maps and a graphic catalogue of its charts.

Besides its work on the primary survey, the Bureau continues, whenever needed, re-surveys of harbors and bays, and, incidentally to its main work, it has aided the States of Connecticut, New York, Maryland, Virginia, and North Carolina in the development of the area and availability of their oyster grounds. It has aided in rectifying the boundaries of several States. It has published charts of the magnetic declination, dip and intensity throughout the United States. Appendices 12 and 13, Report of 1882, contain data indicating variation of the needle anywhere in the United States during the last century, or for a quarter of a century to come.

ANCIENT CITIES OF AMERICA,*

BY

PROF. FREDERICK A. OBER.

It is of an old world I shall write to-night, not the Old World of the historian and geographer; not of the Orient, but of the Occident: the Old New World of which our own Continent forms a part. This continent, declares the highest authority, "has also its past, for facts show that, while America may be called the New World, in consequence of having been the last to come under the general knowledge of geographers, it is from most points of view, an old world. It abounds in the oldest known strata; it has yielded some of the oldest remains of man, indicating that he has been long a denizen there;

* The illustration (frontispiece) represents the ruins of Uxmal in Yucatan. To the left, in the distance, (and hardly seen in the picture) is the Casa de la Vieja, or Old Woman's House; next comes the Casa del Gobernador, or Governor's House, showing the west front and about three-fourths of the building; to the right of this and below it the Casa de las Tortugas, or Turtle House, so called from a row of turtles in regular succession above the upper cornice; and behind this a great pyramid with a broad platform and without a monument and known as the Cerro de los Sacrificios, or Hill of Sacrifice. To the right of this pyramid is another, built in stories and surmounted by a fine temple, now in ruins.

Still to the right, and more in the foreground, is the curious building known as the Casa de las Palomas, or Pigeon House, from the vast triangular peaks which rise from the decorative wall that surmounts the edifice.

In front of these buildings, and buried in the forest in the middle ground, are other ruins, the most remarkable of which is the Tennis Court; and last of all stands, in the foreground, the southern wing of the Casa de las Monjas, or Nuns' House, with the great doorway, which afforded access to the inner courtyard, where are still to be seen remnants of the pavement.

and it has afforded evidence of a civilized era which may even have preceded that of Western Europe."

But in a recent number of the London *Spectator* (May 17, 1884), I find this query: "Why do Europeans, and especially we English, (who spend so much time in ransacking the history of the past) do so little towards the investigation of the early history of America? Because it is the Americans' work? If so, then the Americans perform it very badly."

And then the writer proceeds, while at the same time expressing great respect for me and my work, to decry my method, and the American method of exploration. He is welcome to his opinion. But why, indeed, have not the English engaged in these explorations? Is it not because they have persistently refused to recognize that our country had a past? Have they not always denied that we had any claims, even upon the regard of the Old World, because, forsooth, we had no ruins, no antiquities, no historic age long past?

But, at last, the scales seem to have fallen from their eyes; they admit our antiquity; we may have had ancestors!

Why needs a man to have been born a Briton, to possess the qualifications for a successful explorer? What does it signify, that I myself am some two centuries removed from my English ancestry, so long as I am of Saxon origin? And are not the libraries, the galleries, the museums, and the antiquities of the East as accessible to me as to the European?

But let us not complain; it is a great and significant admission that, in the eyes of Europe, the halo of antiquity invests us!

"World wrongly called the New, this clime was old
When first the Spaniard came, in search of gold.
Age after age, its shadowy wings had spread,
And man was born, and gathered to the dead;
Cities arose, ruled, dwindled to decay,
Empires were formed, then darkly swept away;
Race followed race, like cloud-shades o'er the field,
The stranger still to strangers doomed to yield."

Nowhere in the Western World had an ambitious architecture been disclosed, until Yucatan was discovered—that mysterious peninsula, which extends like a beckoning finger from the Mexican main into the Caribbean, towards Africa and the Atlantic.

Hernandez de Cordova, in 1517, first sailed along its coast, and saw, gleaming white above its strand, towers and walls of glistening lime and stone. Other temples and idols were found by Grijalva, in the year following, at the north-eastern extremity of Yucatan, as well as on the Mexican coast; to which Cortes, in 1519, and other voyagers subsequently added numerous examples, scattered throughout Central and Southern Mexico.

In order more fully to comprehend their scope and importance, by comparison, let us leave Mexico for the moment and glance at the pre-historic monuments of the United States.

The eastern coast of our Continent was inhabited by red men—Indians, (so-called) who possessed no fixed habitations, nothing else than temporary huts and wigwams, and whose knowledge of the arts was confined within a very narrow circle of acquirements. These wigwams of deer-skin, or buffalo-hide, or the bark of trees, were the dwellings of the nomadic peoples found in occupation by the "discoverers of America:

" Very spacious was the wigwam
Made of deer-skin, dressed and whitened."

And of its occupant, we read in *Hiawatha:*

" Straightway from the shining wigwam
Came the mighty Megissogwon;
Tall of stature, broad of shoulder;
Dark and terrible of aspect;
Clad from head to foot in wampum,
Armed with all his warlike weapons,
Painted like the sky of morning."

We cannot deny that the Indian, in his native wilds and costume, is picturesque and extremely attractive.

Taking cognizance merely of these wanderers, let us now turn to a different section of our territory. While noting that, save for insignificant earth and shell heaps, they left no remains worthy of notice, we will direct our attention farther westward.

It is well known that the most ancient works of any extent, of an early people in our territory, are those of the Mound-builders, whose home seems to have been mainly in the Mississippi and Ohio valleys, extending northward, as the traces of their occupation show, as far as Lake Superior, southward to Florida and the Gulf of Mexico, and from the base of the Alleghanies up the valley of the Missouri. We learn with wonder of these great earth mounds; at Miamisburg and near Newark and Marietta; of the graded way at Piketon, and the monster mound at Grave Creek—a truncate cone, 78 feet high and 900 in circumference; of Cahokia and Fort Ancient; of the works in Washington County, Miss.; of the Stone Fort and the wonderful stone graves of Tennessee so rich in crania and relics.

We find mounds in the shape of serpent and of mastodon, mounds containing graves, and even plastered rooms, "sacrificial altars," and innumerable specimens of ceramic art, implements and ornaments. With this casual reference, we must leave these Mounds, among which I do not feel at liberty to wander, since they are, in a measure, pre-empted by distinguished archæologists. The Mound-builders have left no enduring monuments of stone; yet these earth structures are well-nigh indestructible; and we trust may yet yield some relic of their builders that shall disclose their origin—still shrouded in mystery.

Let us turn our attention further to the West. Here we find in portions of New Mexico and Arizona, the semi-civilized Pueblos, living in vast communal buildings of adobe.

Evidence is lacking, perhaps, as to their great antiquity as a people; yet, though we may not declare that their original structures were coeval with the mounds, we cannot disregard them in a paper on the ancient habitations of America.

These Pueblos are most numerous in the upper valleys of the Rio Grande, such as Taos, Pecos, Zuñi, Acoma, etc., and scattered throughout New Mexico and Arizona. Perhaps the northernmost is Taos, north of Santa Fé, one of the oldest at present occupied, built in two villages, in a fertile valley, on either bank of a gently-flowing stream. Its base story is 400 feet long by 150 wide, and the whole pyramidal pile 50 or 60 feet in height.

At Pecos, not far from the Hot Springs of Las Vegas, was maintained the sacred "perpetual fire," long cher-

ished by the people; the fire which died away at the dissolution of the tribe, when the American army approached New Mexico 40 years ago.

Wonderful structures are these pueblos, of a type unknown elsewhere in America. They are built mainly of adobe, a sun-dried brick, in successive terraces, the roof of each story forming a platform before the entrance of the one above. The style of architecture, as seen in the roof tops of the pueblo of Zuñi, is peculiar. There are no stairways but only rude ladders, by means of which access is had to the upper rooms, and the houses are provided with queer chimney-pots, and clay ovens, in which the Indians bake their bread. The original locations of most of the pueblos were upon the summits of great cliffs and *mesas* or table-topped hills, inaccessible except at one or two points, and hence capable of being defended against their numerous enemies. One pueblo, which I visited 3 years ago, that of Acoma, is built upon a mesa nearly 300 feet in height, access to which is only had by two tortuous paths cut in the solid rock—everywhere else the sides are perpendicular, so that the situation is entirely impregnable.

In the year 1530, word was brought to Mexico that there were great cities in the vast and unexplored North, cities of fabulous wealth, inhabited by cultured people. In 1540, a great expedition was organized, and the brave Coronado, with his soldiers, went in search of these famous cities. They found them at last, but found in them no wealth of gold or silver. Zuñi was the centre of the group known as the *Seven Cities of Cibola*, now in ruins; another cluster was that of Tusayan, now occupied by the *Mokis*, a people strange and interesting.

They also were perched upon almost inaccessible *mesas*, which the Spaniards found it difficult to capture, such a torrent of rocks and stones was rolled down the precipices upon their heads, as they stormed the Moki citadels.

The Moki city pueblo of *Hualpi* we may find to-day, frowning from its secure fastness upon its rock-ribbed *mesa*. The dwellings of its people are built like swallows' nests, in the crevices of the rocks.

But there are other structures yet more ancient than these pueblos, and not to be neglected even in a brief summary. These are the Cliff Dwellings, found in portions of Utah, Colorado and Arizona. Aerial dwellings, perched amongst the all but inaccessible cliffs of vast cañons and gorges; now existing in solitude, and long since abandoned by their builders, of whose history we know absolutely nothing. Silent and deserted, we find them now; it may have been ages since they were abandoned, long enough for important meteorological, perhaps even for geological, changes to have taken place. Many of them are built in caves and caverns, several hundred feet above the beds of ravines, and reached solely by precarious paths leading up the faces of almost perpendicular cliffs. With the impending rock high above them, the inhabitants of these cliff-fortresses securely entrenched themselves in such retreats as the gloomy Colorado cañon, with its mile-high walls of rock.

I have said that the ancient *Pueblo* people long preserved in their *estufas* what was called the *perpetual fire*. They also cherished, we are told, a tradition of the coming of a deliverer, who was to free them from

the slavery to which the Spaniards (at one time) reduced them. Every morning, as the sun rose above the horizon, they would watch from their roof-tops for the coming of Montezuma—a culture-hero nowise identical with the Aztec emperor of the same name.

The Pecos tradition says that Montezuma was born of a virgin, and as he grew up herded sheep, with an *eagle* to keep him company. The eagle is regarded with a peculiar veneration by the Pueblos; they keep eagles in cages and tame them, so that they become attached to their captors. The eagle of their tradition took their Montezuma upon his back and flew with him to Mexico, where he became the head of a great people.

But it is not for us to linger longer on the borders of Mexico, nor to indulge in speculation as to the people; profitless will it be, unless from abundant proofs we can educe something to enlighten us as to their origin, or discover their connection with a cognate people. These three great areas of dissimilar remains, the Mounds, the Pueblos and the Cliff-Dwellings, lie to the north and north-east of Mexico. Between them and the ancient cities of the South is a vast territory, with hardly a vestige of fort or dwelling; yet traces remain—infrequent ruins—that suggest, if they do not indicate, a connecting link in the chain of pre-historic, semi-civilized peoples of America.

We find these traces in the ruins of the *Casas Grandes*—the Great Houses—of the rivers Gila and Salinas, in Arizona, and in the north-western corner of Chihuahua, a northern State of Mexico. These buildings, some of which were 800 feet in length by 200 in breadth, are of *adobe* brick, and in terraces (like the

Pueblos) and have been in an abandoned condition since the time of earliest Indian tradition. No one knows who their builders were. There are no related ruins in any of the border States of Mexico.

According to the story, the Aztecs came originally—or at least, first emerged out of the obscurity of the past—from the north-west, from the section in which lie the *Casas* groups. It may have been situated here, that "Land of Whiteness," Aztlan, "Country of Herons," where the little bird sang to the Aztec priest the seductive song: *Tihui, tihui!*—"Let us go; let us on!"

They went, at all events, migrating from Aztlan, and this is the first traditional intimation we have, about the middle of the 12th century, of the people later known as Aztecs, or Mexicans. Their own picture-writings show them as living in the caves of Chicamoztoc, their subsequent migration, and their barbarous, nomadic life, when they subsisted entirely upon the chase and the wild plants of the field. And again, as settled at Tezcoco, and engaged in the pursuits of agriculture, being surrounded by figures of the maguey, cultivated cactus, and other plants.

It is only on and near Mexican territory that we encounter any tradition whatever of ancient peoples or ruins. About the end of the 12th century, the Aztecs, (still pursuing a southward course) arrived at the Toltec city of Tula, where, after a halt of 50 years or more, they went on into the Valley of Mexico.

In the Mexican Gallery of Art, there is a painting which vividly depicts the types and conjectural costumes of that ancient period. It commemorates the discovery of pulque, and represents the beautiful princess, Xochitl

(the flower of Tollan) presenting the first cup of the precious beverage to her sovereign. This event is said to have taken place about 1025.

Five hundred years before—about the year 700, if we may accept the earliest chronicles of Mexico—there arrived here, out of the darkness that shrouded their origin, another people, known to history as the Toltecs, more advanced than any other Americans of that time in the arts of civilization. They here built Tula, or Tollantzingo, the remains of which—groups of *adobe* walls, a "zodiac," sculptured "hieroglyph" and some colossal caryatides—may still be seen, and must be regarded with peculiar interest.

Here another thread leads us back into that misty country of Indian tradition to the northward, for Toltec chronicles point to the north-east as the home of this race or nation. Thus we have two lines of migration leading, conjecturally, at least, out of the mysterious North, and converging at the margin of the Valley of Mexico, subsequently world-renowned as the centre of Aztec supremacy and the seat of their capital city, founded here in 1325.

Tenochtitlan, the City of the Cactus Rock, which grew to be the centre of Aztec supremacy and power, was founded on an island in the middle of Lake Tezcoco; the date of its erection and the migrations which preceded it are emblazoned on the Aztec picture-writings. The Aztec priest had prophesied that when they should find an eagle perched upon a cactus, with a writhing serpent in its claws, there and then they should rest; there they should build their capital. It was on an island in Lake Tezcoco, in the year 1325, that they

beheld the promised sign. Here they settled, and here grew to be a great and powerful people. At the coming of the Spaniards, in 1520, the ancient capital disappeared, for the Spaniards only took it house by house, and stone by stone, tearing down temples and palaces and filling up the canals with the *débris;* but many places remain that were identified with the conquest and with the Aztecs, and which are fully authenticated. In entering the city for the purpose of observation, we naturally turn our footsteps toward the *plaza mayor*, the great central square, for it was also the centre of the former city, and indicates the site of the Aztec *teocalli*, or temple of sacrifice. Recent excavations, made in the summer of 1881, have brought to light the very corner-stones of this sacred edifice, and have thus vindicated the statements of early historians.

According to the best authorities, this building was a pyramidal structure, truncate, built in successive stories, each of which was reached by a flight of steps only after passing around the entire pyramid. One hundred and fourteen steps led to the square platform at the summit, about one hundred and fifty feet above the ground. This was the temple of their war-god, Mexitli, or Huitzilopochtli, and their place of sacrifice.

And do we find here any of the vast structures described by the Conquistadores? Any of the mighty teocallis, or temple-pyramids? Are there any remaining of the temples and palaces, with vast enclosed courts capable of holding 3,000 men—the halls of Montezuma and his royal father, Axayacatl? No! Not a vestige remains of the ancient Aztec City. Idols, calendar stones, many minor objects of antiquity have been re-

covered—the National Museum is full of them—but of the edifices themselves hardly a trace may be discovered. If I were describing merely the works of the aborigines, the sculptured stones, such as the war-god, *Huitzilopochtli*, the Sacrificial Block, and the Calendar Stone, I might mention many interesting objects connected with those departed days. But these remains pertain more especially to their arts, their religion, and a description of the aborigines themselves. Hence we pass them by, and hasten to those grander works which belong to an era preceding that of the Aztec.

Yet we cannot neglect the great Sacrificial Stone, about which are clustered historical associations more sacred, and lies more stupendous, than about any other object of antiquity in the world. For, say the old historians of Mexico, upon this stone, with its sculptured border of conquering kings, were slain the prisoners taken by the Aztecs in battle; not less than 70,000 in one year—at the time of its dedication. How many thousands since, no one knows; but it, doubtless, has been well soaked in the blood of the slain.

Near to, and overlooking this sacrificial block, stands now—as it stood four centuries ago—another relic of those dead days of Indian idolatry: their first and most famous god of war, *Huitzilopochtli*, before whom all those barbarous sacrifices took place. These two sculptures are doubtless of Aztec origin; but another—still existing in Mexico City—where it may be seen cemented against the western wall of the Cathedral—the so-called "Calendar Stone," must have been a work of the Toltecs. It is a large block of basalt, 11 feet in diameter; various interpretations have been given of its sym-

bols; but I will not attempt to decide, when even the archæologists differ among themselves. Its central figure represents Teotl, the sun deity, and those in the margin, possibly, the zodiacal signs, by which those clever Toltecs calculated the recurrence of the equinoxes; or at least, of their feast-days and festivals.

Shall we lament the total destruction of the ancient Capital, as an irreparable loss? If we reflect that the date of the founding of Tenochtitlan was but 560 years ago—when its first rush huts were constructed, we shall not be likely to consider the demolition of its buildings as of great import.

Every ruined city of Mexico antedates the Aztec epoch; every group is, moreover, *pre-historic!* But is there anything remaining to tell us of those most ancient of peoples who preceded the Aztecs? Yes! Seeking again the verge of the Vale of Anahuac, we shall find magnificent monuments, in the pyramids of San Juan Teotihuacan, about 40 miles distant from Mexico City. There are two: the Pyramid of the Sun—*Tonatiuh Iztacual*—is 200 feet high, with a base-line of 700 feet; the Pyramid of the Moon, 130 feet high and 500 square, contains a deep well in its centre, to which leads a narrow gallery. These pyramids are of earth, but were once faced with cut stone, and a golden sun and a silver moon are said to have once glittered on their respective summits, guiding to this holy place—*Teo-ti-hua-can*,—"City of the Gods," vast throngs of worshippers.

An unexplained and perplexing feature of this locality is a long avenue lined with little mounds called the *Mi-co-at-li*, or "Path of the Dead"—*Camino de los Muertos.* Another is the great abundance of terra-cotta figurines,

grotesque in feature and singular in design, which may be found scattered broadcast throughout the adjacent fields. These pyramids may be Olmec, Toltec, Totonac, or even the work of the Quinames—or antediluvian giants—but it is beyond a shadow of doubt that they were built by a people about whom history is silent.

About 60 miles distant, south-east from the City of Mexico, at an elevation above the sea of nearly 7,000 feet, is the largest structure of the plateau, the world-famous Pyramid of Cholula. It is built of *adobe*, mainly in alternate layers of brick and clay, rising in terraces to a height of 200 feet, with a base-line of 1,000 feet and a summit platform nearly 200 feet in breadth. It has, at the present day, more the appearance of a natural elevation than an artificial one, though no doubt exists as to its artificial character; for in cutting a road, some time ago, a section was detached, revealing a square chamber of stone, with a roof of cypress beams, which contained some interesting antiquities.

Cholula, even so late as the arrival of the Spaniards, was a most holy place, in Indian estimation, and set apart for the priests of Quetzalcoatl, "God of the Air," a temple dedicated to whom adorned the summit of the pyramid. This, the largest pyramid of the New World, naturally suggests comparison with the grandest structure of its kind in the Old World: the great pyramid that lifts its hoary head above the banks of the Nile. This, though twice the height of the Mexican pyramid, has but three-fourths its length of base. Cholula, in fact, is of about the same height as the third of the remarkable group at Ghizeh, with nearly three times its length of base; and the broad area of the Cholulan pyramid

would suggest that it has lost a large portion of its structure and that, in ages past, it must have reached a greater height. I myself have climbed its terraced sides—as also those of Teotihuacan—and have gazed for hours upon the pastoral plain spread at my feet, lost in contemplation of its beauties; and have wondered whence came the civilization that had evoked this monument, and whither had departed the aboriginal culture that disappeared at the advent of the Spaniards.

All the ruins hitherto described are of *adobe*—of sun-dried mud;—but there are others that differ from the table-land type in character of material and relative position. We shall find in the warmer regions alone, of Mexico, below the level of the plateau, those structures of stone that have excited the admiration of the world.

The first ruined structure of stone is on the western slope of the Cordillera, about 70 miles from Mexico City —a *cerro* 300 feet in height, with terraced sides, called Xochicalco, or "Hill of Flowers," crowned by a building, 60 feet square, made of great blocks of porphyry. Beneath the crown of the hill is a series of caverns, with a main saloon 90 feet in length and walls and floors laid in cement. Crossing the plateau and descending its eastern slope, easterly from the Volcano of Orizaba, we find other ruins of stone. Buried in the fragrant vanilla forests, on the line of demarkation between the *tierra caliente* and the *tierra templada*, overgrown with the rank luxuriance of tropical woods, stands the Pyramid of Papantla, built in terraces, about 60 feet in height and breadth of base. A city stood here, in the time of Montezuma, which paid him tribute of cotton, corn, *chile* and grains of gold. In the same forests are the

ruins of Mizantla and Tuzapan, anciently cities of great beauty, with temples and sumptuous edifices. By referring to the map, we may note all the great groups of Mexico and Guatemala. And I wish to call particular attention to the fact—which I shall emphasize in my conclusions—that all the cities of stone, (with but few exceptions) are in the South—in the Isthmus of Tehuantepec and the Peninsula of Yucatan.

Returning to the table-land, and travelling southward, we enter the triple valley of Oaxaca, each arm of which is filled with mounds, and every commanding ridge guarded by vast and complicated earth-works. During an exploring tour of a thousand miles a-saddle, I hastily investigated these remains which indicate by their numbers the crowded population that must, at one time, or in successive ages, have gathered here. In the Valley of Tlacolula, running in the direction of Tehuantepec, is the crowning achievement of those ancient people, in the magnificent palaces of Mitla, than which no ruins in America are, in their peculiar style, more elaborately ornamented.

Humboldt, though he describes them, never saw these ruins. The first exploration was in 1802, by Don Luis Martin and Colonel De la Laguna from Mexico, who visited and sketched the ruins, and from whom Humboldt got his information. In 1806, Dupaix and Castañeda, and in 1830, the German traveler, Muhlenpfordt, made plans and drawings which were published, the originals of which may yet be seen in the Institute of Oaxaca. Muhlenpfordt's plan, given by Bancroft, is said to be the only general one ever published. The

French archæologist, Charnay, took photographs of Mitla a score of years ago.

There are five groups of ruins, three of which are in excellent preservation. A portion of the village is built among them, and lies near the bed of the shallow and treeless river. After crossing this river-bed you enter the little *adobe* hamlet, where the only vegetation is cactus and nopal, and find yourself unexpectedly amongst the ruins. As they do not lay claim to regard so much on account of their height as for their extent and elaborate ornamentation, the wall of the first rises before you while you are yet unaware of its vicinity. Though it contains some immense blocks of porphyry, and traces of hieroglyphic painting, its ruin is more complete than that of the second group, to which we anxiously hastened. The first collection is about one hundred and twenty feet by one hundred, and the walls, fifteen to eighteen feet high, enclose a large court, on three sides of which are rooms. The outer walls of all the ruins are composed of oblong panels of mosaic, forming grecques or arabesques. There seems to be no sculpture on the walls, but only this peculiar mosaic, formed of pieces of stone, each one about seven inches in length, one in depth, and two in breadth, accurately cut, and fitted into the face of the wall, forming patterns so complicated in their nature that only an engraving can properly represent them. The mosaic, all the figures of which are rectangular or diagonal, gives the distinctive character to Mitla that distinguishes it from all other ruins. The façades of the Yucatan ruins are carved, while Palenque is noted for its sculptures and stucco in bas-relief, and Copan for its idols and altars. We are over-

whelmed with the magnificence of this great work as a whole, and impressed by the careful execution of the details.

Beneath a wall of the northern building is an underground chamber known as the *subterraneo*, in the shape of a cross, each arm about twelve feet long, five and one-half feet wide and six and one-half feet high. The immense block of stone that covers the junction of the two galleries is supported by a monolith, called the "Pillar of Death," from a tradition that whoever embraces it will die before the sun goes down.

From its geographical position, lying between the two great systems of Yucatan and Mexico, Mitla seems to form a connecting link; for, while standing out peculiarly conspicuous in its singularities of architecture and ornament, these very peculiarities may be the product of the civilization of each country. It was the traditional religious centre of the ancient Zapotecs, called by them the Dwelling of the Dead. There are five groups of structures, each 120 feet by 100, with walls 16 to 18 feet high, enclosing a large court. There is no sculpture here, but a peculiar mosaic, formed of pieces of cut stone, fitted into the faces of the walls in patterns so complicated that only a photograph can properly show them. These oblong panels, forming *grecques*, all the figures rectangular or diagonal, give its distinctive character to Mitla. Some of the panels still exhibit traces of elaborate ornamentation in color; and in one case the *grecques* are cut in the solid rock. All the halls are at present roofless; but in one of them, called the "Hall of Monoliths," are six pillars of porphyry, 18 feet in height; unlike anything else discovered in America.

Massive blocks, some of them 16 feet in length, formed the sides and lintels of doorways.

The third group is the most interesting, since not only are the outside walls cut in mosaic, but there are several rooms and courts, the sides of which are a labyrinth of *grecques.* The lintels of this and the adjacent ruin are immense blocks of porphyry, one of which is 19 feet in length, a solid block of stone, raised to its present position by some lost process of engineering, certainly by one that is unknown to the Indians of to-day. The rooms are narrow, and at present open to the sky, but were once undoubtedly protected by a roof. But what distinguishes the ruins of Mitla from all other remains of Mexican architecture is, as stated by Humboldt, six columns of porphyry, 14 feet in height, which are ranged in line in the centre of a great hall. They are very simple, having neither pedestal, capital, nor architrave, but stand as almost the only examples of the kind found in American ruins.

Above these ruins is a stone church, in the central portion of this bench of the foot-hills on which they are built. We entered the curacy adjoining the church, which was simply the old building of the Indians, roofed with tiles, and were hospitably received by the cura, who recounted to us the traditions respecting his strange abode. This ruin is larger than the others, being 284 feet long and 108 wide, with walls 5 or 6 feet thick. Two great stone pillars, 12 feet high, stood in front of the door-way. The walls had the same ornamentation of diagonal mosaics, and the portion used as a stable contains the best preserved fragments of paintings in the ruins, of characters resembling the Egyptian, exquisitely

colored in red and black, the colors yet fresh and bright. The cura was very intelligent, though he had Indian blood in his veins, and he had very clear ideas as to the uses of the various buildings. The first group, he said, was probably used as quarters for the troops; the second, the largest and most elaborate, was the palace of the King of the Zapotecs, who came here two or three months in each year, as to a *buen retiro;* the third and highest building, from which and out of which the church was built, was used by the priests, and these paintings that adorned the panels in the walls were probably hieroglyphical, and in their custody. (See also, p. 541, "Travels in Mexico.")

How the aborigines moved those great monoliths, or how they so skilfully carved them, are secrets never yet penetrated by modern engineers; but their quarries are quite a mile distant from the city. With Mitla, ends the list of ruins found on the plateau, this group occupying a position on its extreme southern verge. But, although we have glanced at many groups, we have not yet penetrated into the region containing the noblest structures. At a point a little north of west of Mitla, far distant in the State of Chiapas—most accessible to us by the River Tabasco, from the Gulf of Mexico, lie what are universally acknowledged to be the most magnificent ruins in America.

> "Palenque, seat of kings—
> At every step some palace greets the eye:
> Some figure frowns, some temple courts the sky."

This royal city, once the seat of ancient empire, is situated 8 miles distant from the modern town of Palen-

que, and though Cortes passed quite near it, in 1524, it was not discovered until 1750.

There are at least five great structures erected upon high mounds of vast dimensions, the grandest of which is the Palace—so-called—280 feet long by 180, but with a height of only 25, built of stone, with mortar of lime and sand, and with the entire front covered with stucco, painted in red, blue, yellow, black and white.

In sculpture and ornament, Palenque is richer than any other group of remains in America, its prominent features being the numerous bas-reliefs in stucco which take the shape, not only of plants and flowers, in delicate tracery, but of human figures, some of which—says an authority—"in justness of proportion and symmetry, approach the Greek models."

> "We walk the rooms where kings and princes met;
> Frown on the walls their sculptured portraits yet;
> Strange their costumes; ye see no native face—
> Life, brow, and hue, bespeak an Ethiop race."

Which description, for a poetical one, is quite accurate. Pyramids, aqueducts, and numerous ruins far gone in decay, are buried in the dense forest. Besides the "Palace" are other grand edifices, and one, built upon a pyramidal elevation 110 feet high, and known as the *Casa de las Piedras*, is rich in stucco, bas-relief and hieroglyphic tablets.

Grouped about are, the "Temple of the Sun," "Temple of the Bean Relief," "Temple of the Three Tablets;" and in a ruinous temple known as "Casa Number Two," is a portion of the famous sculpture known as the "Palenque Tablet," containing that figure of the Cross, of mysterious origin. How came the builders of Palen-

que to possess the emblem of Christendom? No one knows; but there it existed, sculptured by some Indian Phidias; centuries, ages, perhaps, before the Christians reached America. It is not a sole example, others having been found in Yucatan. It is thought, however, to have been a symbol of the rain-god. A portion of this interesting tablet was torn from its position by vandal hands, and may now be seen in our National Museum; another lies buried beneath the mould of the Tabascan forest, while but one-third remains affixed to the wall in its original position.

Prof. Rau, of the Smithsonian Institution (to whom we are indebted for its restoration), publishes an interesting comparison between the glyphs sculptured on the tablet and the symbols of the Maya alphabet of Yucatan, belonging to a people who now occupy that peninsula. He assumes to find points of contact between the two, and only such differences as would naturally exist between the writings of a language at epochs perhaps thousands of years apart.

"It requires no practiced eye," says one, "to trace a resemblance in general features to Egyptian architecture; though it must be said that the details of the American, and the sculptures, are peculiarly original in design." Both Bancroft and Prescott find—"Between American and Egyptian sculpture, a very striking general resemblance, but while sculpture in Egypt is for the most part in intaglio, in America it is usually in relief. In the former country the faces are expressionless, always of the same type, and though executed in profile, the full eye is placed on the side of the head; in Ame-

rica, on the contrary, we meet with many types of countenances by no means lacking in expression."

Throughout several centuries, there flourished in Central America the great Maya empire of the Chanes, or Serpents, known as Xibalba, with its seat at or near Palenque. Its first establishment, at a remote period—probably about 1000 B. C.—was attributed to a being called Votan. Its language was doubtless the Maya, now spoken in Yucatan.

If we were to trace the extension of the Xibalban empire, or rather the ruins bearing an impress of Palenque, into Central America proper, we should find numerous examples; as at Ocosingo, and the Quiche capital, Ututlan; and especially at Copan, in Honduras, near the Guatemala boundary. There we find an immense wall enclosing an area 900 by 1,600 feet; a pyramidal terrace, 600 by 800 feet, of great blocks of cut stone, and an edifice called a temple. Most noteworthy at Copan, are sculptured pillars, idols, altar-stones, their backs covered with hieroglyphics, which could, no doubt, were the key once discovered, tell the sealed story of Copan's greatness. There is no nearer approach to the obelisk than the altar, or idol-stones of Copan, though these even fall far short of the granite monuments of the Nile. Traces of pre-historic man extend southward, through Central and South America, even to the highlands of Peru; but our present enquiry does not extend beyond the confines of Mexico: let us retrace our steps. The ruins of former races seem to culminate in the peninsula of Yucatan, in the wonderful structures that still remain a mystery to man.

Somewhere buried in the vast and impenetrable forest

of this region, is supposed to stand the mysterious "Silver City," its shining walls visible only at a distance, and said to be still occupied by the descendants of its original builders. Whether or no this be true, this vast wilderness contains the most glorious vestiges of former civilization on this continent.

The predominant characteristic of these ruins is, that all are built upon an artificial pyramidal elevation; the walls of the buildings are generally of great thickness, mostly of cut stone, richly sculptured;—busts, human heads, figures of animals, and hieroglyphics. The finest workmanship is displayed in broad and elevated cornices. Sixty-two groups have been discovered, many within a radius of 100 miles from Merida, the capital of Yucatan. None is more interesting than Uxmal, 60 miles distant, and which I first saw in March, 1881.

The first object that greeted me was a lofty pyramid, called the *Casa del Adivino*, or "House of the Soothsayer," up the steep sides of which we climbed, and on its summit, 105 feet above the ground, found a narrow temple 70 feet long and 12 deep, rich in carved hieroglyphics. A glorious spectacle was spread around us: to the west, directly below, was the *Casa de las Monjas*, or "House of the Nuns," in its ruins beautiful beyond description; south, the principal building of the group, the "House of the Governor," or *Casa del Gobernador*, raised upon its immense terraces, one of which also supported the "House of the Turtles" (*Casa de las Tortugas*), with the "Nameless Mound" beyond them all; east of south lay the ruins of *Casa de la Vieja* (the "Old Woman's House"), all tumbled about her head; from south to west circled mounds and clusters of ruins, such

as the "House of the Pigeons" (*Casa de las Palomas*), and the remains of an extensive series of buildings; beyond this city could be seen other ruins, perhaps other cities, reaching out in a long line that could be traced miles away.

> "The dense wild wood that hid the royal seat,
> The lofty palms that choked the winding street,
> Man's hand hath felled, and now, in day's fair light,
> Uxmal's broad ruins burst upon the sight."*

By far the finest building of the city, conspicuous alike from its position and the completeness of its preservation, is the "Governor's House," the *Casa del Gobernador*. After the Conjurer's Pyramid, this was the next pile visited by us, and made the point of departure for subsequent excursions during the five days we remained there. It stands upon the topmost of three terraces of earth—once perhaps faced with stone, but now crumbled and broken. The lowermost and largest is 575 feet long; the second, 545 feet long, 250 wide, and 25 feet high; while the third and last is 360 feet in length, 30 in breadth, and 19 in height, and supports the building, which has a front of 322 feet, with a depth of only 39 and a height of but 25 feet. It is entirely of stone, without ornament to a height of about ten feet, where there is a wide cornice, above which the wall is a bewildering maze of beautiful sculpture. The roof was flat and once covered with cement, in the opinion of certain travelers, but is now a miniature forest of the indigenous shrubs and small trees of Yucatan—a hanging-garden of Nature's own formation, such as she covers every object with, in a few years, in this tropical portion of her domain. There are three large doorways through the

eastern wall, about 8 feet square, giving entrance into a series of apartments, the largest of which is 60 feet long and 27 deep, divided into two rooms by a thick wall. The ceiling of each room is a triangular arch capped by flat blocks at a height of 23 feet above the floor. The latter, like the walls and the jambs of the doorways, is of smooth, faced stones, that may once have been covered with cement.

Within a stone's throw of the "Governor's House" is a small building far gone in ruin, displaying workmanship of great skill, and sculpture chaste in design, and called the "House of the Turtles,"—*Casa de las Tortugas.* It derives its name from a row of turtles used as ornaments to the upper cornice. It may have served as the kitchen to the royal residence—accepting Indian tradition in regard to the names—but was once beautiful enough for a temple.

If the "Governor's House" claims attention from its conspicuous position and size, the *Casa de las Monjas*, the so-called "House of the Nuns," presents the greatest variety of sculptured forms and richest ornaments. It is composed of four buildings, the largest of which is 279 feet in length and not more than 25 feet high, and enclosing a court 258 feet long and 214 wide. The entrance is on the Southern side, through a high arched gateway 10 feet wide. There are no doors or windows opening on the outside, though there are in all 88 apartments opening upon the court.

The façades of this immense quadrangle are ornamented with the richest and most intricate carving known in the art of the builders of Uxmal. That portion forming the western boundary, at the left as one enters the court, is

the most wonderful of all; for its entire length of 173 feet is covered by two colossal serpents, whose intertwined bodies enclose a puzzling variety of sculptured hieroglyphics.

These twin serpents represent *Kukulcan*, the "Feathered Serpent," identified with the Aztec God of the Air, Quetzalcoatl. In another decade of years it is possible that this grand conception embodied in stone by the Indian sculptors will be mutilated beyond repair, as a great portion of the wall has already been torn away for building purposes. Yuccas and other semi-tropical plants adorn the roof and also the ground in front, rendering approach to it somewhat difficult. At the southern end of the court the folds of the serpents surround a standing human figure, now much mutilated, a subject rarely used in the ornamentation of these buildings. If the drawing by Catherwood, made 40 years ago, is correct, all the faced stone below the figure has been torn away since he was there. The northern and eastern façades have been greatly injured since his visit, and most of the grotesque ornaments, the rosettes and heads, broken or wrenched entirely away. The hand of man, indeed, proves more ruthless than the hand of time.

These three structures comprise the principal buildings at present in a state of preservation that makes them of interest to the general traveller. There are others, even in this group, (as mentioned in the view from the high mound), but they are in such a state of ruin that their original form is obliterated.

South from Uxmal are the extensive ruins of Kabah, where are buildings with fronts of 150 feet, and lavishly ornamented. Unlike the façades of the buildings of

Uxmal, which were only decorated above the doorways, those of Kabah were "ornamented from their very foundation." Stephens also adds: "The cornice running over the doorways, tried by the severest rules of art recognized among us, would embellish the art of any known era; and, amid a mass of barbarism, of rude and uncouth conceptions, it stands as an offering by American builders worthy of the acceptance of a polished people." At Labná the sculpture is profuse, grotesque, and florid. Of the sixty or seventy ruined cities scattered throughout Yucatan, none offers points of greater interest than Uxmal. The ruins of Copan, in Honduras, are distinguished for the number of idols and altars richly sculptured; those of Palenque, in the State of Chiapas, for the profusion of stucco adornment, tablets, bas-reliefs, and statuary; Uxmal, for the richness of its sculptured façades, the magnitude of its buildings, and the chasteness and beauty of its statuary—judging from the few specimens discovered.

Thirty miles from Merida is the mound of Mayapan, an oblong pyramid, which is thought to have served as a gnomon mound, and several sculptured slabs. About 100 miles distant from the capital, east, are the ruins of Chichen-Itza, scattered over an area of 2 miles, and next in importance to those of Uxmal. The next most magnificent pile here is also called the *Casa de las Monjas*, which is very rich in sculpture. Another grand ruin is called the *Carcel;* this is a circular building standing on a double-terraced platform, and is 22 feet in diameter and 60 high; the *Casa Colorada*—or Red House—is highly ornamented, and has a stone tablet covered with inscriptions; while the most remarkable structure is the one

called the Gymnasium; two parallel walls 274 feet long and 30 thick, with two stone rings set in them mid-way their length, in the shape of two serpents with intertwined bodies. The hieroglyphic carvings of Chichen are of exceeding beauty, while its mural paintings (artistic in execution and of superior merit) represent warriors in battle and events in the lives of the various Itzac rulers. A carved eagle and lynx were found here, a procession of sculptured tigers ornaments one of the cornices; while the ornament known as the "elephant trunk" frequently recurs. This symbol (the elephant trunk) has long perplexed archæologists, who were unable to account for its existence; for the elephant was, of course, unknown to those ancient architects, though they may have learned (through tradition) of the mastodon.

It was here that Dr. Le Plongeon (a recent explorer) disinterred the monolith known as Chacmol, a statue 9 feet in length, which was taken from him by the Government, and now lies in the Mexican Museum. He also claims to have discovered more recently (1883) 7 stone serpents, and a group of 15 statues, supporting a circular table.

Chichen is known to have been the abiding-place of the Itzacs—ancient inhabitants of Yucatan—after they had been driven from other portions of the peninsula; but all attempts to reconstruct their history from the scattered fragments left by tradition, and from the mural paintings and hieroglyphs, have met with little success. Older than Chichen (it is thought) are the pillars of Aké, an Indian province adjoining. Here, upon an artificial *Mesa*—or platform-mound—225 feet

long by 50 wide, we find a series of 36 stone columns, 14 to 16 feet in height. The early chroniclers tell us that these were intended, not as supports for temple-roof, or altars for sacred fires, but as *Katunes*, or calendar-stones. As each one represented (it is supposed) a period of 180 years, one antiquarian claims an undeniable lapse of nearly 6,000 years from the time the first stone was placed in position until the place was abandoned. These grand, suggestive, yet mute memorials of antiquity—these pillars of Aké—appear to me to be the oldest monuments of aboriginal civilization that our country can produce; they stand unique, the work of giants.

The locality of every one of these cities was determined by the natural features of the country. As there are no streams in Yucatan—above the surface—water is only obtained from subterranean rivers, to which deep caverns open. And these water-caves, called *zonotes*, —some of them a hundred feet in depth—are found in every group of ruins. They are reached by rude ladders of poles, up and down which scores of active Indians travel day and night.

A sacred shrine of the Mayas, where for a thousand years Indian priests are supposed to have burned incense of styrax and copal, is Izamal; where we may see to-day that gigantic head of stucco, its impressive face looking out over the plains once occupied by countless thousands of the Itzac race, now deserted by all save the ocelot and wild turkey.

We have now reached again the northern extremity of Yucatan, at the point where first the Spaniards saw, in 1517, buildings of lime and stone. Here is Tuloom,

but one example of the cordon of stone cities, temples, palace, drawn along their northern coast. Buried in dense forest are extensive buildings, sculptured rocks, altars, and painted walls. Now this entire coast region, once teeming with active inhabitants, is a wilderness. From the lonely watch-tower Tuloom—it is centuries since it echoed to the foot-fall of the sentinel—one may look out across a channel of the sea to Cozumel Island, where Cordova, in 1517, and Cortez, in 1519, found temples of stone.

Thus hastily sketched, you have had before you the more important of the ancient cities and pyramids of Mexico; many more, even, lie shrouded from human view in the tropical forests of Central America. Many and many a hieroglyphic record exists there, unread, undeciphered; many an inscription that might throw light on the early history of America, were but another Champollion to arise, and another Rosetta Stone found to put us in possession of a clue to the meaning of these mystic symbols.

Leaving for future examination the various minor objects of antiquity; the innumerable idols, articles of obsidian, metal, and ceramic art; leaving also for another occasion the tracing of hieroglyphic and linguistic affinities—the chain of evidence afforded by a study of sculptured stone and aboriginal languages, let us now ask first: What evidence of origin or antiquity do these ruins afford us? I assume: First, they are of great antiquity; this assumption being based upon internal and historical evidence. How great may not be permitted us of the present age to learn. But every group

under consideration, without an important exception, is pre-historic! Surrounding the works of the Mound-builders there is a veil of obscurity we may never be able to penetrate; not even the tradition of a tradition lingers. Of the cliff dwellings we know as little; of the Casas Grandes, nothing; and it is only as we approach the historic centre of Aztec civilization—the valley of Mexico—that we are made acquainted with myths and legends, "tales told by the old men," regarding the occupation of Tula, Cholula and Teotihuacan. But these, even, do not give us anything satisfactory regarding their constructive epoch.

These were all silent cities, at the advent of the Spaniard; not one has been found occupied, either by its original inhabitants or by their descendants. Nor, so far as we can learn from native evidence, did the people resident in the country possess any knowledge that these cities had been occupied. Nightly, according to Indian belief, the spirits of their builders roam throughout the area of ruins, and woe betide the luckless redskin found therein after sunset!

Without committing ourselves to any hypothesis of origin we may, at least, safely assume for these ruins great age. All knowledge of their beginnings is forgotten; tradition cannot materially aid us in our search, but stronger presumptive evidence we cannot desire than that afforded by an examination of the forest growth, of the deposition of humus, and by the fact that nothing perishable remains. "Four hundred years ago (says Baldwin) the forest which covers Yucatan, Guatemala and Chiapas, was growing as it grows now, and it was there a century previous; how many additional centuries

no one can tell. If its age could be told it would still be necessary to consider that the ruins hidden in it are much older than the forest, and that the period of civilization they represent closed long before these trees had attained their growth. * * * We must consider, also, that the building of magnificent cities is not the first work of an original civilization! Its first period was more or less rude. Many ages must have been required to develop such admirable skill in masonry and ornamentation.

Let me remark, in conclusion, that no well-considered theory of these ruins can avoid the inference that most of them are very ancient, and that, to find the origin of the civilization they represent, we must go far back into the very deeps of "antiquity!"

We may grant that man has had a long residence in America; that his most ancient home appears to have been in the tropical portion, and further, that in no region is there such accumulation of evidence as to extreme antiquity as in that of Palenque and Yucatan! Another question arises: Whence came the builders of these cities?

Let us enquire into the possible sources of origin, as evidenced by analogy of structure, similarities of workmanship and adornment, and by the lines of migration, as shown by the distribution of the ruins.

The Jewish theory, which assumed the first settlers to have been the lost tribes of Israel, who came by the way of Behring Strait, after wandering an indefinite number of years through India and Asia, has been long since exploded; and successively abandoned have been the Malay, Arab, Japanese, Irish and Chinese theories—all,

in fact, that supposed civilization brought from the west or by sea. Not that it shall be denied that any of them may have landed on the coast, and have left an impress of their civilization, but they never could have come in sufficient numbers to have fixed it. Failing to find a resemblance in these remains to the Egyptian (says one writer), we look elsewhere in vain. They are different from the works of any known people; of a new order, entirely and absolutely anomalous!

And of the Phœnicians: "If it were true that the civilization found here came from them it would be true, also, that they built in America as never anywhere else; that they established a language here radically unlike their own, and that they used a style of writing totally different from that which they carried into every other region occupied by their colonies."

In fine: "The particulars in which the Americans are shown to resemble any given people are insignificant in number and importance when compared with the particulars in which they do not resemble that people."

It requires some hardihood to advance the theory of an autochthonous people, that sprung from American soil, and here developed—with or without extraneous aid—a civilization *sui generis*. "But it is an opinion (says Bancroft) worthy the greatest consideration, and which may eventually prove to be scientifically correct."

As to the distribution of the ruins. Does this fact indicate anything: That all the stone cities are in the South, or on the eastern slopes of the Cordilleras towards the Gulf of Mexico; or, if near the Pacific, only where the Gulf and the Western ocean approach each other most nearly? We have seen that all the

structures of the plateau between New Mexico and Mitla are of adobe, or sun-dried clay; while Mitla, on the extreme southern verge, is of a core of clay with stone facings and an intrusion only of stone ornament! All those cities and pyramids celebrated in Aztec history—made familiar to all readers of the "Conquest"—sink into insignificance when compared with those of the South; they lack the first elements of grandeur, stability and durability; they are of mud; while the magnificent works of the South are of stone—massive, quarried blocks, and ornamented with sculpture and painting. Let the eye range over the map of Mexico, and it will seek in vain for a prominent monument north of latitude 23°. Let it take a wider range, cross the Equatorial line, seek, in South America, the ancient home of the Incas, and it will be seen that none exists below latitude 23° south!

And is not this a significant fact: That the two tropics constitute the boundary to this wonderful civilization. In the tropic-belt alone was it developed. And, if we examine particularly the location of the Central American ruins, we shall see that only in the *tierras calientes*—in the hot regions—of Mexico and Yucatan are the vastest areas of stone structures!

Admitting, even, that there was an early immigrant element into Mexico—that the ancestors of the Aztecs (and possibly the Mound-builders) came down into this country from the north-west and north-east respectively, no one can point out any direct line of migration!

Between the Casas Grandes and Tula a thousand miles intervene; more than a thousand between Tula and the mounds of Louisiana! From an examination

of analogies of structure, as exhibited in more than superficial resemblances, we cannot trace this Central American civilization northward beyond the northern halting-place of the sun. The builders of those wonderful cities were indeed CHILDREN OF THE SUN, worshipping that luminary, basking in its beams, extending themselves not a degree beyond its most radiant influences.

Finally, the conclusion forced upon me is, that this civilization was either indigenous, or obtained from the East; either autochthonous, or influenced by an Old-World contact; but with a world older than Europe—older than Asia; Atlantis, perhaps, or a portion of our own continent now beneath the waves. "The grand enigma of our continent" is that wrecked empire in the wilds of Central America, in the solution of which is contained the secret of our past, and perhaps a note of guidance for the future!

THE COMMERCIAL GEOGRAPHY OF THE AMERICAN INTER-OCEANIC CANAL.

BY

CHARLES H. STOCKTON,

LIEUTENANT COMMANDER, U. S. N.

The work done upon the canal at Panama, and the commencement of active operations along the Nicaraguan route, make an examination of the commercial conditions of the area to be affected by a ship canal across the American isthmus, a matter of present and increasing interest.

In viewing the subject as a whole, one is led to compare the American canal with that of Suez, and to be especially struck with the fact that while the Suez Canal has caused a diversion and a shortening of trade routes already long in existence and between thickly populated and long developed countries, the American canal will open a direct route to the Pacific, an ocean of comparatively modern discovery, and will bring within reach countries for the most part of recent settlement by civilized people, and only just entered upon an era of development which is already great, and promises to expand into amazing proportions. Hence while we look for a steady, though slow increase of trade through the Egyptian Canal, we may reasonably expect to see pass through our own, a trade increasing with great rapidity, simply to keep pace with the development and growth of the populations of our Pacific States, of the insular Pacific, and of the Australian semi-nationalities.

It is not considered necessary to discuss in these limits the saving in time, and distances that will be effected by the use of the trans-isthmian canal, for this has often been recounted, and an examination of the map of the world will readily show the gain in the principal routes. It is, perhaps, even unnecessary to remind the reader of the stormy and unfavorable winds, the tedium and the perils that must be encountered on the route to the Pacific from Europe and Eastern America by the way of Cape Horn. All these vexatious delays and hardships will be avoided by the new route to the Pacific, and the world may then be circumnavigated wholly to the north of the Equator, and with comparative quiet and expedition by way of the two great ship canals.

We may expect as the general effect of this canal upon our own country a great increase in the development, and importance of our trade. The expansion of our ordinary domestic and coasting traffic between the Atlantic and Pacific can readily be foreseen. But besides this we must bear in mind that the centre of gravity of our population is slowly but surely approaching the great continental valley of the Mississippi, and that this dense interior population will not only afford a great market for imports, but will also furnish for exportation a constantly increasing volume of products, which must pass by the long water communication through that river, its tributaries, and the canal, and thus reach freely and without transshipment all the countries of the Pacific. The development of our country will be thus accelerated simultaneously in its three great physical sections included within the general limits of the Atlantic and Pacific slopes, and the Mississippi valley. Is it

not then within the bounds of reason, to expect upon the heels of this enormous domestic trade, a foreign commerce unequalled in our history, and perhaps in that of the world? With the closing of various artificial trade channels—a result sure to follow on the use of this new water-way—not only will the world at large be benefitted, but more especially the consumers in our country. When we consider, for instance, that most of our Peruvian bark comes from England, that, except what we receive from Brazil, most of our crude India-rubber comes to us from the same source; that tea from China comes to New York in large quantities by the way of London and Germany, and that American hardware still reaches Australia by the way of London and Liverpool, we can realize how in some cases circuitous routes can be made straight and long distances shortened.

With the canal placed upon a strictly commercial basis, free and open to the shipping of the world, neutralized in time of war by the general agreement of all nations, its control will not be a military bone of contention, and the interests of this country upon the Gulf and the Caribbean can be guarded by a moderate, but efficient naval force stationed at places other than the terminal waters of the canal. The three plans that are now proposed for the solution of the question of ship transit across the American isthmus are:

First. The construction of an inter-ocean ship canal at the Isthmus of Panama.

Second. The construction of a ship canal and water route by the way of Nicaragua.

Third. The construction of an inter-ocean ship railway across the isthmus of Tehuantepec in Mexico.

The first plan is that of the Panama Canal. Ground was broken for this work in 1882, and it is still in the course of construction. It has met many very serious engineering difficulties, and the extravagant expenditure of money has brought the present company constructing it, to a state of financial distress. Up to the present time the French Government has refused to grant direct or indirect assistance to the company, and as the work is less than one-third finished, it is not unreasonable to consider its eventual completion a matter of reasonable doubt. There seems little question, however, that if it should ever be completed, its cost will be so great as to prevent its being a financial success to the company now constructing the work. As to the second, or Nicaragua route, nothing is being done in actual construction; but a concession from the Goverment of Nicaragua has been obtained by a provisional company duly chartered and organized under State law.

A company of engineers is now engaged in making a detailed and complete survey along the route preparatory to the work of construction. Although this canal company has not yet been chartered by the Congress of the United States, the route is the final result of the many surveys carried on at various times and in different parts of the isthmus by officers of the U. S. Navy and under the auspices of the Government; and it is the favorite route in this country. Although this work can be carried on without a charter from the U. S. Congress, the final construction company have applied for its sanction, and have reasonable assurance that the

charter will be granted before the end of the present session.

The third plan proposed for the inter-oceanic transit to the Pacific was that urged by the late Captain Eads for the construction of a ship-railway across the isthmus of Tehuantepec. The concession for this project has been granted by the Mexican Government, and is couched in terms which make it virtually a Mexican affair. It has not as yet secured an additional charter from the Congress of the United States, but can, of course, proceed without one. This scheme of transit is so foreign to the ordinary methods of navigation, that, though in a limited or occasional way it may be made an engineering success, the possibilities of frequent mechanical derangement are so great that for this reason alone, without considering many others, the writer fails to see how it can ever become a commercial success, or solve the great question of inter-oceanic transit. The death of the promoter upon whose fame, gained in undertakings of a different nature, this scheme seemed to rest, will, I think, be a fatal blow to the enterprise. In the examinations and discussions that follow, this plan will not be taken into consideration.

In examining and comparing the various routes to the isthmus, the proximity of the terminal points of the proposed Panama and Nicaragua canals, as well in the Caribbean as on the Pacific, is so close that, as a rule, no reference will be made to either canal. That a canal will be built at one or both places is regarded as a certainty, and an examination of the field that will be tributary to this new highway of the world cannot be too early made.

The present routes to the Pacific by the way of the Caribbean Sea and the isthmus from our North Atlantic ports are the well-known ones through the Windward and Mona Passages, while from the Gulf ports the track lies through the Yucatan Channel.

The steamer routes from Europe, leaving from the English Channel or the Straits of Gibraltar, go either by the way of the Azores or by Madeira; and the sailing routes reaching still farther south join the steamer routes, both entering the Caribbean in the vicinity of St. Thomas. Guadeloupe, or Barbadoes. All of these present routes will continue to exist with little change upon the opening of the canal.

The steamer routes in the Pacific are now, coast-wise, North and South; until, reaching San Francisco to the northward, other routes are met with extending to Oregon and Alaska, to China and Japan, and returning to the southward and westward to the Hawaiian Islands and Australia. From Valparaiso, in Chili, a southerly continuous steamer route now exists by the way of the Straits of Magellan to the east coast of South America and the European ports. Sailing routes to and from Panama in the Pacific can hardly be said to exist, so seldom are they used. Brito, however, the proposed terminus of the Nicaragua Canal, is much better placed for sailing vessels, as they emerge from the canal. The route from San Francisco to Brito alone is nearly two weeks shorter than that from Panama, and all of the sailing routes from Brito would possess decided advantages over those starting from Panama.

A new trade route from our Atlantic and Gulf coasts to China and Japan would be made possible by the

canal, with a point of call at the Hawaiian Islands; and our vessels bound to Australia and New Zealand would then find a shorter way to these countries, calling either at Tahiti, the Marquesas Group, or Rapa Island, in the mid-Pacific.

The route to the west coast of North and South America would be made continuous both from Europe and our eastern seaboard, and our new routes to the Philippine Islands and the Dutch East Indies should find an American port of call in the mid-Pacific among the Gilbert Islands, a group which our missionaries have done so much to reclaim from barbarism.

In examining the existing trade conditions of the Pacific countries we find, in general terms, that Europe and the United States furnish about all of the trade coming from the Eastward. Europe sends almost exclusively manufactured articles, such as metals, cotton, woollen, silk and linen fabrics, and various articles of wooden and earthenware, the only raw material in bulk, worthy of note, being coal from Great Britain; and since the rapid development of the coal-fields of British Columbia and Puget Sound, of Japan, Chili and Australia, on the shores of the Pacific, this trade has relatively declined. In addition to our manufactured articles, the United States send as raw material coal and petroleum and some lumber.

The return trade from the Pacific is almost entirely composed of raw materials, of which wheat, wood, gold, silver and copper, coffee, coprà, sugar, nitrates and teas may be mentioned as the most important. In making a detailed examination of the countries that will be reached by the canal, we find in Central America, with

many of the outlets for its trade on the Pacific, a rich and diversified region, the greater portion of which is at an elevation sufficiently great to afford a climate suitable for a white population. Notwithstanding this fact the whites are in a small minority, and the resources of this region are but scantily developed, while a great portion of its export trade goes past our doors to Europe, and a still greater amount of its imports is supplied from that continent. The principal articles of export from the Central American countries are coffee, indigo, hides, india-rubber, dye and cabinet woods, sugar, cocoa, and tropical fruits. The greater part of our coffee and indigo supply should come from Central America, instead of from Brazil and the more distant East Indies.

The cultivation of tropical fruits, and especially the banana, has been greatly stimulated in the Central American countries by their nearness to the practically unlimited market of the United States. Increased facilities of communication by railway and steamer have brought these perishable fruits within the reach of the dwellers in the distant interior. The demand outruns the supply, and sections of Central America, the rivers, lagoons, harbors and railroads, are being lined with banana plantations, the existence of which depends upon the market afforded by us.

In addition to the great agricultural and pastoral resources of Central America, partly shown by the exports, there is great mineral wealth lying yet untouched within the limits of these countries. Resources of this kind exist in San Salvador, Nicaragua, and more particularly in Honduras; and their develop-

ment is not only retarded by the want of capital directly applied, but also by the want of facilities for transportation. Among these mineral resources are gold and silver, and rich deposits of iron and "brown coal."

The United States ought to supply the greater part of the articles of importation into these countries, such as the cotton, woollen, linen and silk fabrics, the provisions and petroleum, now furnished by England, Germany and France. The value of the exports from Central America is shown by recent statistics to be, in round numbers, $21,000,000, while that of the imports amounts to $16,000,000. Surely this trade so close to us is worth having, and the enterprise and intelligence of our merchants should now look beyond our home limits and prepare to take advantage of the cheaper transportation which the canal will afford. They should also adopt the system of long credits and the practice of careful packing, which have done so much to secure the European hold on the Central American trade.

The Pacific coast of Mexico, though so much longer in extent and so much richer in resources than its Gulf coast, furnishes, owing to its isolation and want of development, but one-sixth of the export trade of that nation. In addition to the more valuable minerals that abound along this coast and furnish twelve-thirteenths of its exports, there are resources of iron, coal, lead and tin that cannot be said to have been explored. Of other articles we need only mention the unequalled cacao of Soconusco, the famous coffee of Colima, the rice, indigo and tobacco of the Southern coast, and the salt, phosphates and orchilla of the regions about the Gulf of California. The goods wanted from the outside

world are mainly the same as those required in Central America, the trade being in both cases, to a very large extent, in the hands of Germans, who are so successful as merchants in these countries. Though the Germans are too shrewd to force German goods, exclusively, upon the people, they are ready assistants, whenever practicable, to the German manufacturer, with his cheaper and inferior goods. The preparation given the future German merchant before starting from home greatly aids his after success. Commercial schools and trade courses have been inaugurated to fit the scholars for their career in foreign lands, and of late a school of living Oriental languages has been instituted in Berlin, partly with a view to educate persons about engaging in business in Eastern countries.

The great export staples of our States and Territories of the Pacific coast are breadstuffs, particularly wheat, barley and flour. Besides these, the Pacific States ship lumber, canned salmon, ginseng, quicksilver, and gold and silver in ore and bullion. The value of one of the breadstuffs as a commercial staple can be duly appreciated when it is considered that nearly one-half of the wheat exported from the United States is supplied by the Pacific slope. The breadstuffs are sent mainly to Europe, and will go through the canal in all probability as a return cargo in freight steamers belonging to the Atlantic coast. The superiority of this improved transportation and the economy of the steamer in commerce can be better understood when it is known that the sum of all the port entries of the world shows that sailing vessels make three, and steamers fifteen voyages per annum, so that the average carrying-power of a steamer

is five times as great as that of a sailing vessel. In addition to the various staples of the Pacific slope, many of the products of the waters and islands of the Pacific will be brought together at San Francisco and sent eastward by the canal. This is already the case with the cargoes of most of the vessels engaged in the fur, seal and whale fisheries of the North Pacific. San Francisco, with its fine geographical position, magnificent harbor, excellent internal water communications, and its great railway systems, possesses obvious advantages which, combined with the intelligence, foresight and energy of its merchants, and its greater proximity to the European and Atlantic markets, must place it above all of its possible rivals in the Pacific. With direct steamer communication to and from Europe by way of the canal, will end the singular isolation and dependency which have so long retarded its advancement. The most striking effect of the opening of an inter-oceanic canal upon our trade to the west coast of South America will be the saving of the time now lost by the delay and the trans-shipment of goods at Panama. Not only will the continuous water route do away with detentions and the missing of connection at Panama, it will greatly lessen also the cost of freights and cannot fail to give us a fairer share of the commerce with Western South America. The articles of export common to the countries of this coast are gold and silver ores and bullion, cinchona or Peruvian bark, hides and coffee. With these must be mentioned the cacao and India-rubber of Colombia and Ecuador, the sugar, guano, vicuña and alpaca wools of Peru, and the nitrates, copper and breadstuffs of Chili. The canal will be the natural out-

let for almost all of these articles bound to a European or Atlantic market.

Of the manufactured products that go in return we should supply the larger share, not only in articles more peculiarly American, but in those common to Europe and America. In railway plant alone our material, which is better fitted for these countries than that made in Europe, should control the market, while in Bolivia our merchants would find a commercial field hardly explored by Americans.

Turning from the coast of South America, we find that England, France and Germany are rivalling each other in the absorption of the various groups of islands which dot this vast Pacific Ocean.

Polynesia, which has for its eastern boundary the west coast of South America, has now its western limits at the 180th meridian. In this division of the Pacific the French predominate politically, but not commercially. The first group of islands, however, that we meet with in leaving the South American coast, the Galápagos, is under the jurisdiction of Ecuador. This group contains a small and uncertain settlement of Ecuadorians, and being out of the line of the present commercial routes and with only tolerable harbors and water supply, it is at present of little trade importance. There is, however, in the interior of the islands, quite an area of good soil, capable of sustaining a considerable population, and the group, from its geographical position, may acquire a certain importance upon the opening of the canal. The other islands off the coast of South America will remain insignificant factors in the future trade of the Pacific.

The three great groups in the mid-Pacific controlled by France are the Marquesas, Paumotus, or Low Archipelago and the Society Islands; and with the last I class the outlying islands of the Austral group, and the island of Rapa, all under the control of France. The principal product of these islands, is at present, coprà, or the dried kernel of the cocoanut; after this follow pearls and pearl-shell, sugar, cotton, and tropical fruits. The soil of these islands is also capable of raising coffee and tobacco, and is suitable for the pasturing of live stock. Of the products just named, the sugar and the tropical fruits will find a market in the Pacific, and will not be likely to pass through the canal. For coprà and cotton there is a steady demand in Europe, but as the production of cotton is restricted by the unsettled condition of the labor question in the tropical and sub-tropical Pacific, coprà would be at first the only great product passing through to the Atlantic.

The various islands to the westward of the Society Islands and the French possessions, forward their products when collected to San Francisco, Tahiti, Auckland, and Sydney; or, coming within the sphere of trade of the German South-Sea Company, they send their produce to Apia in the Samoan islands. The commercial organization known as the "German South Sea Trading and Plantation Company," is the successor of the once famous Hamburg firm of Godeffroy & Co. Its operations extend across the Pacific from the Society Islands, through the Samoan, Tongas, Gilbert, Marshall, Caroline, and other groups, until they reach New Guinea and Cochin China.

The firm of Godeffroy & Co., whose former principals

largely hold the stock of the South Sea Co., was in existence for a century. Before 1857 its operations were confined to the Indian Ocean, in the East, with Cochin China as headquarters, and in the West, to the coast of South and Central America, with Valparaiso as the central station. In 1857, a station was established in the Paumotus or Tuamotus, and operations were extended to the westward. The Samoan islands were finally made the headquarters in the Pacific. In 1872 the establishment at Apia numbered thirty-four Europeans, mostly Germans, and numerous supernumeraries of all nationalities, and occupied about 25,000 acres of land, of great fertility, obtained from the natives. This land was acquired in various ways, one method being by barter; Messrs. Godeffroy & Co. enjoying exceptional advantages during the civil wars among the natives from their control of a manufactory of firearms at Liege, Belgium, through which they could supply guns at a "cheap rate and reasonable profit," for money or for land. The natives sold freely and indiscriminately to such an extent that at the present time more land is claimed, by whites alone, than is represented by the actual area of the islands. These claims, if legalized, would leave no resting-place for the natives who still number in the whole group about 35,000 souls.

Godeffroy & Co. established at Yap, in the Caroline Islands, an intermediate station between Samoa and their old agencies in Cochin China, and acquired 3,000 acres of land. By this time the firm had an agent in every productive island of this part of the Pacific which was inhabited by natives disposed to permit white men to reside and trade among them.

Before the Franco-German war a programme of colonization was drawn up for Upolu, the most fertile island of Samoa, and a German man-of-war, the *Hertha*, was *en route* to Samoa, to prepare the way for military settlers from the home country. These plans were suddenly ended by the outbreak of the war, the recall of the *Hertha*, and the French blockade of Hamburg. The suspension of all commerce with Hamburg resulted in the failure of Godeffroy & Co., and after the return of peace, the stock and good-will of the firm were taken by the South Sea Company and, notwithstanding the fact that the company has failed to receive, so far, the direct guarantee of the Imperial Government, it has gone on with the indirect influence of the Government at its back. How actively this influence is exerted the current news of the day tells us.

The Marshall Islands have been annexed to Germany, the Caroline Islands were almost absorbed, and the Samoan islands, owing to the indifference of the English Government, not to speak of our own, are likely to be "protected" into a German colony at an early date.

Commercially, the South Sea Company has not met with the success of its predecessor, and there are English, Americans, and other German rivals now in the field. Of late years, two American firms from San Francisco, have entered into competition with the German Company, and were our trade and traders closely followed by our flag, as the German merchants are supported by Germany, the American traders, who are more popular with the natives, could maintain their trade influence and acquire a firmer foothold.

The great staples of the other islands of Polynesia,

Melanesia and Micronesia, are the same as those of the French possessions in the mid-Pacific. As we go to the westward and approach the Malaysian and Asiatic islands the soil becomes capable of growing indigo, ginger, nutmegs, and other spices, as well as various fibre-producing plants. The imports of these islands consist mainly of provisions, lumber, hardware, liquor, drygoods, and clothing, in the parts inhabited by whites; while in the partly civilized and savage islands the articles desired are tobacco, calicoes, hardware, and small pieces of wrought iron; American knives and axes having the preference.

The Fiji islands since they became, in 1874, an English colony have developed a wealth and prosperity which are more particularly due to the greatly increased cultivation of the sugar-cane. This cultivation is restricted only by the want of labor; the labor problem being the one upon the solution of which the future prosperity of all the tropical and semi-tropical Pacific islands greatly depends.

The Fijians, Tongans, Samoans and the natives of the French islands will not, as a rule, work as plantation hands, and so the white planters have been securing their laborers by various methods (even by kidnapping), from the New Hebrides, the Salmon, the Gilbert, and other islands in and about the equator. These men of low intellectual order make good laborers, but their numbers are diminishing, and their unwillingness to go to the plantations, especially to those of the French and Germans, is manifestly on the increase. To meet this difficulty, Indian and Chinese coolies have been brought into the Fijis and employed for stated terms, and with a

fair measure of success. It is among the possibilities that by these coolies or by a mixed race proceeding from them, this labor question may be solved.

If Australia be regarded as a continent, New Guinea is the largest island in the world, and its partition in 1884 between England, Holland and Germany, will doubtless lead to greater activity of trade here, and to the opening of its resources. With its large population estimated at 5,000,000, it offers a field for commercial activity, and its soil is capable of producing all the products of the South Pacific and Malaysia.

New Zealand belongs to the domain of the American canal, both with regard to the United States and Europe. It is third in trade importance of all the Australian colonies, and is peculiarly fit for colonization by whites of Anglo-Saxon origin. Being insular, with abundance of coal, great pastoral and agricultural resources, and fairly provided with good harbors, it should become, besides a wheat and wool-growing, a maritime and manufacturing country, and an important element in the commerce of the canal. Its exports, amounting to over $35,000,000, consist mainly of wool, frozen meats, gum, flax, tallow and gold. The imports, which exceed $37,000,000 in value, consist principally of cotton, woollen and linen fabrics, hardware, machinery, and sugar, all supplied from Europe and the United States. The Australian colonies proper will be a meeting-place for the European trade, coming by the two routes of the American and the Suez canals, with certain advantages at first in favor of the latter. With the Atlantic States, the trade to and from these colonies will go through our trans-isthmian canal, and the wool of Aus-

tralia should go to the Atlantic coast in exchange for cotton fabrics, hardware, petroleum and machinery.

The Philippine islands and the Dutch East Indies furnish us with sugar, manilla, hemp, coffee, and spices, while we send little in return but petroleum, which is meeting competition with Russian petroleum coming by the way of Suez. The question of the control of the petroleum trade of the Pacific will be fought out by the aid of the American canal, the non-existence of which now seriously handicaps our trade in this article in the Asiatic countries.

The well-known exports of China and Japan will find a new and economical route by the way of the inter-oceanic canal, and the balance of trade which is so greatly against us may be equalized by our improved facilities of interchange. In this field, as well as in the whole of the Pacific, Germany is rapidly increasing in commercial importance.

We shall close our round of the Pacific by a reference to the Hawaiian Islands. The trade of this group, though comparatively large, is almost exclusively with our Pacific States. With the opening of the Isthmus route, some direct trade may come from Europe and the Atlantic States, and the excess of the Hawaiian sugar may go through the canal, but the commerce of the islands will be almost entirely confined to the Pacific. Their importance will be increased by their position as a mid-way point of call on the routes from the canal to China and Japan, these trade routes bisecting the existing ones from San Francisco to Australia, New Zealand and the south-west Pacific.

In closing this review of the commercial field to be

affected by the successful completion of the ship canal between the two great oceans of the world, it is not difficult to see that, with its opening, a great epoch in the commercial history of the world will be begun. The importance of the work to the United States can hardly be estimated. The impetus it will give to our commercial activity can be checked only by the want of wisdom in our laws, or by a lack of the proper amount of intelligence, enterprise and capital in the country. That these abound among us the development of our wealth and prosperity at home sufficiently shows, and the opportunities in store for us upon the sea should not be lost.

GEOGRAPHICAL NOTES.

A NEW GEOGRAPHICAL SOCIETY. — The *National Geographic Society* has been incorporated at Washington, D. C., for one hundred years.

The officers elected for the year 1888 are: Gardiner G. Hubbard, President; H. G. Ogden, of the U. S. Coast and Geodetic Survey, Com. J. R. Bartlett, of the Hydrographic Office, Gen. A. W. Greely, Chief Signal-Officer, Dr. C. Hart Merriam, Department of Agriculture, and A. H. Thompson, of the U. S. Geological Survey, Vice-Presidents; C. J. Bell, Treasurer; and Henry Gannett, of the U. S. Geological Survey, and George Kennan, Secretaries; and Managers Dr. J. C. Welling, President of the Columbian University, W. B. Powell, Supt. of Schools, Washington, Capt. Rogers Birnie, Jr., U. S. A., W. D. Johnson and Marcus Baker, of the U. S. Geological Survey, Henry Mitchell, U. S. Coast and Geodetic Survey, G. Brown Goode, National Museum, and Cleveland Abbe, U. S. Signal Office.

Washington possesses great resources for the collection and dissemination of geographical intelligence, and these will, undoubtedly, be turned to account under an administration composed of men already well-known for their services to the cause of science.

WATER-SPOUTS OFF THE ATLANTIC COAST.—In a Supplement to the *Pilot Chart of the North Atlantic* for March, 1888, the U. S. Hydrographic Office shows the

position of 14 vessels, from which water-spouts were observed between January 12, and February 29, of this year.

In 11 cases the vessels were within the area enclosed by the meridian of Bermuda on the E., the U. S. coast-line on the W., Lat. 40° on the N., and the N. coast of Cuba on the S. The accompanying text of the Chart is by Mr. Everett Hayden, and is here given in a condensed form.

Water-spouts are special cases of whirlwinds. A layer of warm, moist air at the surface of the ocean may sometimes have above it a layer of cooler, drier air. Sooner or later the warm air rises through the cooler air. This process is sometimes gradual over large areas, but is, at other times, more local, and there seems to be formed in the upper layer an opening through which the lower drains upward, as through a funnel.

When there are great differences of temperature and moisture, and the supply of warm, moist air at the surface is great, the action becomes very intense, and still more so as the air rises, because the moisture is condensed and the latent heat liberated.

As the surface air escapes upward through the opening, it takes a rotary motion, the velocity of which increases towards the axis of the funnel and a partial vacuum is created, as indicated by the low reading of the barometer at the centre of a cyclone. In a great cyclone, or hurricane, the direction of rotation is determined by the revolution of the earth about its axis, and this rotation is, in the Northern Hemisphere, invariably *against*, and in the Southern *with* the hands of a watch, as you look down on it, lying face up. This law holds

good in most cases, but not always, for tornadoes and water-spouts.

When a whirlwind is thus formed over the ocean, water is often drawn up the centre of the whirl by the suction created.

When a spout is forming, the upper portion is often visible first, seeming to grow downward from the clouds. Observation with a telescope shows that the motion in the column itself is upward, though the moisture in the rising air is condensed lower and lower down, and makes the whirl appear to be actually descending.

Perhaps the most interesting cases were those reported January 26, 27, and 28 (all near together and less than 4° E. of the New Jersey coast), for the reason that they were clearly associated with a low-barometer area of considerable energy, which moved across the great lakes on the 25th, and was central off Nantucket on the 26th. It has been shown by the U. S. Signal Service that tornadoes on land take place almost invariably in the southern quadrants of an area of low barometer. The reports in the three cases mentioned seem to leave no doubt that whirlwinds and water-spouts are sometimes associated in a similar way with cyclonic storms at sea.

The American bark *Reindeer*, Capt. Strandt, was the only vessel of the 14 that received any damage. On February 11, she was in the Gulf Stream, Lat. 32° 04′, Lon. 76° 06′, running towards New York in squally weather, with light, southerly winds, when a water-spout dismasted her below the heads of the three lower masts. No warning was given; the weather was apparently

clear at the time, and the whole affair was over in a few minutes.

It is the intermingling of the warm, moist air that hangs over the Gulf Stream, and the cool, dry air brought from the land by the north-westerly winds that generates these dangerous whirlwinds on the ocean.

MINERAL PRODUCTS OF THE UNITED STATES, 1882-1886.—The U. S. Geological Survey has published in tabular form the amount and value of the mineral products of the country for the calendar years 1882-1886. The totals are in value:

NON-METALLIC PRODUCTS.

1882.	1883.	1884.	1885.	1886.
$228,410,380.	$242,111,859.	$220,050,674.	$240,114,544.	$243,963,063.

METALLIC PRODUCTS.

1882.	1883.	1884.	1885.	1886.
$219,755,109.	$203,128,859.	$186,426,074.	$181,599,365.	$215,364,825.

UNSPECIFIED.

1882.	1883.	1884.	1885.	1886.
$8,000,000.	$8,000,000.	$7,000,000.	$7,000,000.	$6,000,000.

The product of Bituminous coal in the five years was 333,774,573 tons, valued at $396,560,057; that of Anthracite, 167,952,114 tons, worth $366,955,729; that of Petroleum, 127,495,643 barrels, valued at $109,143,-395; that of Natural Gas, in value, $16,851,350. The increase in this last product is enormous, from 1882, when the amount was $215,000, to 1886, when it reached the figure of $9,847,150. The value of the

Lime produced in the five years was $100,650,000; that of the Building Stone, $98,000,000; that of the Salt, $22,310,826. Of Pig iron, 23,044,556 tons were produced, worth $431,916,413; of Silver, 189,031,513 Troy ounces, worth $244,400,000; of Gold, 7,933,010 Troy ounces, worth $160,101,000; of Copper (including that made from imported pyrites) 688,801,422 pounds, valued at $87,029,710; and of Lead, 1,362,788 pounds, valued at $58,621,491. Zinc was produced to the value of about $3,500,000; and Quicksilver to that of $1,200,000, yearly.

THE SIZE OF IOWA.—*Trübner's Literary Record* is an authority which may generally be trusted for statements of fact; and it is with surprise that the reader comes upon the following passage in a notice of "Agriculture in the U. S. A.," in No. 236:

"There appears to be plenty of room for settlers in Iowa, as it appears that during the past five years 100,974,134 acres of land have been disposed of, equalling four states as large as Indiana, or three-fourths of Germany." 100,974,134 acres are equal to 157,772 square miles. Iowa contains, according to the census of 1880, 55,475 square miles, and Indiana 35,910; while the area of the German Empire is 211,196 square miles.

The *Record* seems to have taken too literally the ample phrase, which it quotes from the report of the Iowa State Agricultural Society:

"Nature (in Iowa), is large, bountiful, leaving nothing lacking, having nothing undesirable."

A State so blest should have and dispose of any possible number of acres.

CLIMATOLOGICAL DICTIONARY.—Mr. L. Cruls, the distinguished Director of the Imperial Observatory at Rio de Janeiro, has undertaken the task of preparing a Universal Climatological Dictionary, to be printed under the auspices and at the expense of the Observatory.

The director asks the co-operation of Observatories and Meteorological Institutions throughout the world and furnishes a printed form to be filled out and transmitted to the Imperial Observatory.

This form is to give:

Place of Observation (in Province, State or Country.)
Longitude (E. or W. of Greenwich), and Latitude.
Number of Years of Observation.
Height above Sea-Level (in Metres or Feet.)
Temperature:—(Centigrade or Fahrenheit.)—
Mean for each month and each year.
Highest, monthly, each month and each year.
Lowest, " " " " " "
Humidity, " " " " "
Cloudiness, " " " " "
(0=perfectly clear sky; 10=entirely covered.)
Rainy days for each month and each year.
(*Rain* includes snow, fog, dew, etc.)
Rainfall (in millimetres or inches), for each month and each year.
Stormy days for each month and each year.
Days of frost, " " " " "
Prevailing winds, " " " "
Absolute highest temperature—date.
Absolute lowest temperature, "
(Centigrade or Fahrenheit.)
Mean annual barometer (in millimetres or inches.)

Mean annual variation of the barometer, (in millimetres or inches.)

Add the name of the Institution on which the station depends, as—"Signal Service, U. S. Army, Washington, Chief Signal Officer, A. W. Greely."

THE MOTION OF AN EARTH-PARTICLE DURING AN EARTHQUAKE.—Prof. Seikei Sekiya gives in the *Transactions of the Seismological Society of Japan*, Vol. XI, an illustration here reproduced, of a diagram delineating the motion of the earthquake which occurred in Japan, on the 15th of January, 1887, as traced on the plate at Tokio.

The shock began about thirty-five miles S. W. of Tokio, and the waves were propagated nearly two hundred miles to the west and north-east along the Pacific seaboard, and on the north-west nearly to the shore of the Japan Sea. The area affected covered about 32,000 square miles.

The explanation of the figures is:

The model is made in three parts, each showing the motion for twenty seconds, or so; thus Fig. 1 indicates the motion from the beginning of the shock to the end of the twentieth second, Fig. 2 from the latter instant to the end of the fortieth second, and Fig. 3 thence to the end of the seventy-second second. At that point the vertical motion practically ceased.

The earthquake begins with short period tremors. During the third second there appears a vigorous horizontal motion, N. W. and S. E. (at right angles to the line joining the origin of the disturbance and the instrument) accompanied by a vertical displacement. Both

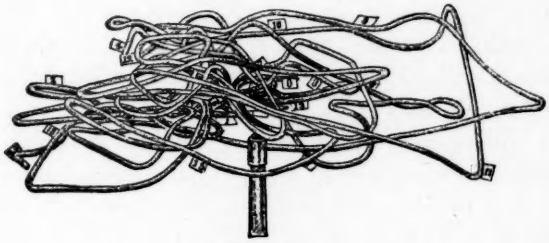


Fig. 1.

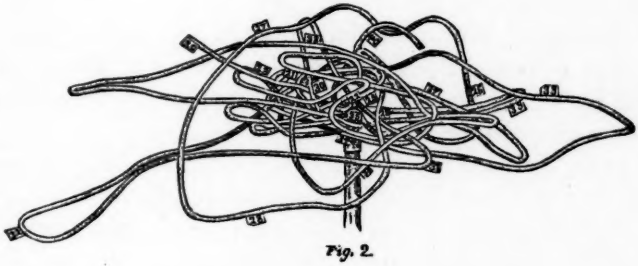


Fig. 2.

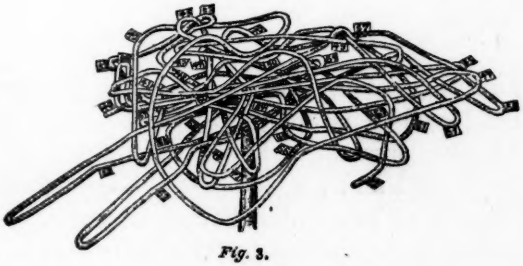


Fig. 3.

THE MOTION OF AN EARTH-PARTICLE DURING AN EARTHQUAKE.

horizontal and vertical motions then continue with great activity. At the ninth second (and again at the tenth), is recorded a vertical motion of $1/20''$, the largest during the shock, and synchronously with it a horizontal motion of $1/5''$ N. W. and S. E., the complete period of oscillation in both being 1.5 seconds. Vertical motions are most marked during the first part of the disturbance.

The maximum horizontal displacement of nearly $1/4''$ occurs from the thirty-third to the thirty-fourth second with the complete period of two seconds. The direction is then nearly W. S. W. and E. N. E., or in a line with the origin of the shock.

Few up-and-down oscillations occur in Fig. 2.

The principal horizontal motions in Fig. 3 run S. E. and N. W., or transverse to the direction of the origin of the disturbance.

In this Figure several outbursts of upward movement are observed, with inert intervals betwen them.

In earthquakes the vertical movement usually ceases long before the horizontal. When large vertical motion occurs, there is usually simultaneous large horizontal displacement; but the latter may be recorded without the former.

The Naming of Places.—The Queensland Branch of the Royal Geographical Society of Australia adopted in October last the following resolution: "That the Queensland Branch of the Royal Geographical Society of Australia views with disfavor the tendency exhibited by some recent explorers in New Guinea, in naming their discoveries, to disregard the native names of the most prominent physical features of the country; that it is

expedient to discourage this growing tendency, and also, in so far as practicable, to preserve the native place-names ; and that all Geographical Societies be invited to co-operate by an expression of opinion."

The expression is sure to be received as information, and laid upon the table, for explorers will follow their own sweet will. They should, nevertheless, be told by all, who can speak with authority, that not to learn and respect and report the native names of places and points and natural features, is to fail in one of their chief duties, and to merit reprobation rather than praise.

MORTALITY ON THE CONGO.—*Le Mouvement Géographique*, of March 11, publishes the official list of the persons (mostly European) engaged in the service of the Congo enterprise from 1879 to December 1887.

The whole number is 427. Of these 189 were Belgians, 89 Englishmen, 50 Swedes, 46 Germans and 15 Danes. No other nationality had a representation of 10; and there were but 5 Americans. There were, in all, 64 deaths ; 15 by accident, and 49 by disease. Of the 49, 37 were cases of fever, the rest of dysentery, congestion and other troubles. The highest mortality was among the English. The Belgians lost 27, the English 19, the Swedes 9, the Germans 3. There was no death among the 15 Danes, the 9 Frenchmen and the 5 Americans. The greatest proportion of deaths occurred in the years 1883–1885, the period of the greatest toils and difficulties.

There is every reason to believe that the death-rate will be reduced with the improvement of the organization of the Free State and the multiplication of comforts.

BURMA.—The *Scottish Geographical Magazine*, for February, has an excellent article on this subject by the late Chief Commissioner of the province, Sir Charles Bernard, K. C. S. I.

Burma extends about 1100 miles from north to south, and 600 miles from China, on the east, to the Bay of Bengal, on the west. It has an area of 280,000 square miles, and is, therefore, much the largest province of the Indian Empire.

The surface is, for the most part, hilly and broken, the level, cultivable land being estimated at barely 50,000 square miles, comprised in the deltas of the Irrawaddy and the other rivers. On the northern boundary are the Patkoi and other mountain ranges, said to be at one point nearly 12,000 feet high; and an immense mountain mass in the north-east divides the province from China. The Shan States form an upland region, cut here and there by deep clefts through which flow the rivers; and buttresses of the Shan mountains come close to the Irrawaddy at Mandalay and the ruby mines further north. These mines are on a plateau 4000 or 5000 feet above the sea.

The rivers are numerous. The Irrawaddy, 11,000 miles long, is navigable by big river steamers for 700 miles, and there are hundreds of miles of cross channels. The Chindwin, 500 miles long, can be navigated for 150 miles all the year, and twice that distance in the rainy season. The other streams have no great depth of water, except in time of flood—about five months of the year.

The extreme rise observed in the Irrawaddy is 44 feet; the average in ordinary years being 35 or 36 feet;

and the river in flood frequently spreads over a breadth of 20 to 25 miles. In the delta the houses are built on piles, and every house is provided with a boat. As the water rises the people retreat to the upper floors, and if a child tumbles into the water, it is fished out, for young and old swim like ducks.

The average yearly rainfall on the coast is 200 inches. At Bassein, Rangoon and other inland places, it amounts to 100 inches, and decreases rapidly to about 35 inches further up the valley. It is again heavier at Mandalay, and still heavier at Bhamo, and at the base of the Shan hills.

Lower Burma has all been surveyed topographically. Something has been done in Upper Burma, but the regular survey is yet to be made.

The relations with Siam and China are friendly.

The Shan States number about 60, large and small, always more or less hostile among themselves. The whole Shan population is about 2,000,000, and some of the larger chiefs have already acknowledged the British supremacy. The policy of the Indian Government is to strengthen the larger States and make them responsible for keeping the peace and protecting the communications.

Sir Charles Bernard estimates the whole population of Burma at a little over 9,000,000, the Burmese proper numbering 5½ millions. He thinks highly of the Burmese. They are manly, cheerful, and courageous, and fairly industrious. They are more generally educated than the Indians; more so, even, than the people of some Northern European countries.

The Burmese women lead a happier life than those of

India. They come out, mix in society, do the marketing, keep shops, and generally share in domestic and social concerns quite as much as Scottish women. They settle their own love affairs, and a Burmese widow can marry again as soon as she gets a chance.

There are in Burma no very rich people, no large landlords, no nobility; and the only aristocracy is the official one. The general prosperity is great, and the people spend their money freely. Wages are four times as high as in India.

The most respected and influential persons are the Buddhist monks who number about 6,000 in Lower, and perhaps 20,000 in Upper Burma. For the most part, they observe their vows of celibacy and poverty very strictly. If for any reason they desire to return to the world, they are free to throw off the monk's robe, and take up the ordinary duties and pleasures of life. They own no property, and enjoy no endowments, but are supported by their parishioners.

Like the Burmese, the Shans are Buddhists. They are poorer than the Burmese and hardier, and they are wonderfully apt traders and pedlars.

The Karens live in Lower Burma. They are agriculturists, and they make steady and capable artizans. They were formerly nature-worshippers, but have been converted by the American Baptist missionaries, and now maintain out of their own resources as many as 600 parishes. Little is known of the other hill-tribes.

The one product of Lower Burma is rice. Upper Burma produces, besides rice, wheat and pulse, and a great deal of cotton, which is exported to China. The vast forests, now under careful supervision, yield teak,

cutch gum, india-rubber and wild tea, which is used, not for drink, but as a pickle. The monopoly of this pickle brought to King Thebaw's revenue £80,000 a year. Among the minerals of Upper Burma are iron, copper, lead, gold, silver, marble, coal, jade and rubies. It will not pay to work the iron, copper and lead; and the gold and silver do not amount to much. The coal is likely to be important. There are three coal-fields; one close to the railway (from Rangoon), another on the Irrawaddy, half-way from Mandalay to Bhamo, and the third on the Chindwin.

The marble is used for statues of Buddha and for the pagodas. The Burmese mines supply all the jade used in China and Japan, and the Chinese who control the product pay what looks like a trivial royalty of £5,000 a year for the quantity they export.

The Burmese rubies are the finest in the world. The district which produces them covers nearly 200 square miles, and the demand for precious stones being, like human vanity, a constant quantity, there should be a boundless market for these gems.

The Burmese petroleum may some day become valuable, but for the present the American article supplies the demand.

Explorations in British North Borneo.—Mr. D. D. Daly, Assistant Resident in charge of Province Dent, gives, in the Proceedings of the Royal Geographical Society for January, an account of his five years' observations. Dent Province occupies the south-western portion of British North Borneo, and presents a nearly blank surface on the map.

The Colony contains 31,000 square miles, with a seaboard of 700 miles, and a total population of 150,000.

The principal land-locked harbors are Gaya, on the west, Kudat, on the north, and Sandakan, the headquarters of the Government, on the east coast.

Besides Dent Province, the divisions are: Keppel Province on the north-west, Alcock Province on the north-east, and the East Coast Residency on the south-east.

Mr. Daly entered the interior from the eastern side by the Kinabatangan River. The first place of importance reached was Malapi, the depot for the edible birds'-nests. These nests are gathered from the Gomanton Caves, about twelve miles north of Malapi. The height of one vault in these caves has been estimated at 900 feet, and some idea of the numbers of the swifts (*Callocalia*) may be formed when it is said that a steady column has been timed by watch to fly for three-quarters of an hour from one of the apertures. The birds'-nests are formed of the inspissated saliva of the birds. The yearly product of the caves is valued at $25,000, and the North Borneo Government let them in 1884 for $9,000 a year. There are many similar caves along the river.

The land was everywhere rich, and suited to the cultivation of sugar and the sago palm. The latter, the chief product of the west coast, has but lately been introduced in the east.

At the Obang-Obang Mountain, at the head of the Melikop, one of the branches of the Kinabatangan River, Mr. Daly obtained a grand view of the Kinabalu range, which rises to the height of 13,698 feet. The orang-utans abound in this region, and their red-

haired skins are made into war-cloaks by the Tungaras. These people had not yet learned the use of guns.

On the Padas River, which empties into the sea on the west coast, there were vast sago plantations and rice-fields. The sago is the pith of the tree, which is cut down when eight or ten years old and split open lengthwise. The pith is chopped out with bamboo scoops, passed through a sieve, and dried in the sun, and so becomes the sago of commerce. As fast as the palms are cut down fresh suckers spring up, so that the plantation renews itself.

The summits of the western ranges are very narrow and precipitous, and many land-slips, caused by the beating of the south-west monsoons on the sandstone formation, are visible from the sea.

On the Pagalan River, a Murut chief placed his house at the disposal of Mr. Daly's party. The house was very clean, but there were fifty-two human heads and numbers of human bones hanging from the rafters. Mr. Daly asked the chief to remove these ghastly ornaments. This request was cheerfully granted, with a certain air of pity for the white man's squeamishness. Some of the Murut tribes have given up the practice of head-hunting, but others, far removed from contact with the English, still maintain it.

The people were found to be friendly and, on the whole, fairly industrious. They are very superstitious, and pay great attention to omens, such as the flight of birds, the starting of a deer, and the like.

In all the rivers, crocodiles are numerous. Mr. Daly saw one captured and towed to the bank. It was fourteen feet long, and there was joy over it, for it had eaten

one of the chief's brothers-in-law. A chief, with his many wives, is generally well supplied with brothers-in-law, and is bound to contribute to their support; and Mr. Daly is led to believe that a Murut does not look upon a crocodile with a wholly malevolent eye.

At Api, on the Padas River, a conference took place and a treaty of peace was signed, in Mr. Daly's presence, between the Muruts and their ancient enemies, the Peluans, both tribes recognizing the authority of the North Borneo Government.

The form of oath, taken by each chief on this occasion, is equally precise and comprehensive, and might be copied with advantage in the practice of more civilized nations.

Each + denotes a chop at a stick:

"I follow the authority of the Government of the British North Borneo Company +. The Sandêwar + and the Peluan + people are now of one mind +. If I kill a Sandêwar (or Peluan) man + when I go to the water may I not be able to drink + when I go to the jungle may I not be able to eat + may my father die + may my mother die + may my wife die + may my children die + may my house be burned down + may the padi not grow in my fields + may a crocodile swallow me + may the eggs never be hatched in my fowl-house + may I never catch a fish when I go fishing + may my life be ended + I cut this stick + as if I was chopping my own head off + the Great Spirit is my witness + may this stick grow into life again + if ever I kill or take any more heads + and I follow all the customs of the British North Borneo Company + and I take this oath with a

sincere heart + and I shall pay the poll-tax of the Company +."

THE POPULATION OF CHINA. — The *Journal of the Statistical Society* for December, 1887, gives from various sources, English, Chinese and Russian, some interesting facts concerning the census methods and the population of China. The census law forms a part of the military administration, under the particular heading: "A Law for searching out Traitors and Spies." In every city, town, village and hamlet it is provided that for every ten families there shall be a tablet on which are to be written the names and number of the inhabitants. Ten families make a *chia*, and an elder is in charge of these. A bailiff, or *pau chia*, is set over every ten elderships. A registration form is filled with the name of each householder, and the number of persons in his family. The bailiff is expected to know the movements of every one in the district, whether at home or abroad, when he leaves home and when he returns, what he is doing, and the like. Inn-keepers and heads of monasteries are required to keep books of registration, and to enter therein the name and occupation of each traveller or visitor.

Every year the number of inhabitants in each place must be reported to the Board of Revenue.

According to a tabular statement published by the Board, the population of the Empire (exclusive of five provinces, from which returns had not been received,) was, in 1885, 319,383,500. The estimated population of the five provinces omitted was 60,000,000.

A table drawn up by the Russian statistician, Mr.

Popoff, from official documents brought down to the year 1879, for eight of the provinces, and to 1882 for the other ten (Shing-King is omitted), shows a total of 382,078,860. In 1842 the population numbered 413,021,452.

The most populous of all the provinces is Sze-chuen, with 67,712,897 in Mr. Popoff's table, for 1882, and 71,073,730 in 1885, according to the Board of Revenue.

After making every allowance for the disturbed condition of China in the period between the years 1842 and 1882, and for the destruction caused by the Tae-ping rebellion, it is still not easy to accept the official figures, as tabulated by Mr. Popoff. The province of Sze-chuen, for instance, is credited with a gain in the forty years of 45,455,933. Kuang-tung, which was almost on a level with Sze-chuen in 1842, made a gain in the forty years of but 8,553,646. The next highest gain is 6,717,958 in Shan-tung. Yunnan follows with an increase of 5,897,906, and after it comes Hoo-pi, with 4,780,441.

Three provinces, Kiang-su, Che-Kiang and Chih-li, lose more than 18,000,000 each. An-hwei loses 16,000,000, and Kan-su more than 14,000,000.

Sze-chuen increased in the forty years 200 per cent., Kuang-tung 40 per cent., Shan-tung 23, Yun-nan 100, Hoo-pi less than 17 per cent.

Kiang-su lost 48 per cent., Che-Kiang 62, Chih-li 49, An-hwei 43, and Kan-su more than 72 per cent.

Geological Survey of New Jersey.—The report of Prof. Geo. H. Cook, State Geologist, for the year 1887, is accompanied by an excellent map of the whole State,

on a scale of 5 miles to an inch. A hypsometrical map, on the same scale, will complete the Topographical Atlas of New Jersey, undertaken by the Geological Survey, in 1877, and carried through at a total cost of $59,892.95, divided equally between the State and the Federal Government.

The Report closes with a tabular statement of the Iron and Zinc production for a number of years. The iron, estimated at 10,000 tons in 1790, reached, in 1870, 362,636, and in 1882, 932,762 tons, the highest figure yet attained. The production, in 1887, was 547,889 tons.

In the Zinc table there are several breaks, but the numbers are consecutive from 1878 to 1887, and show an average annual product of a little over 38,000 tons.

Discovery of America by Northmen.—Address at the Unveiling of the Statue of Leif Eriksen, Delivered in Faneuil Hall, Oct. 29, 1887, by Eben Norton Horsford. *Boston and New York, 1888.*

Prof. Horsford says, in his Preface: "I have attempted to present in the address the essential story of the discovery of America by the Northmen, omitting only the matters which properly enough may appear in an account of the life and usages of the people, but which do not so immediately concern the strict history of the Discovery of America."

The attempt is in every way successful, nor can it be believed that the story is to be found elsewhere in a form equally concise and full, and pervaded, at the same time, by a spirit at once so critical and so respectful towards the facts of history.

Certainty, with regard to the landing-place of the Northmen, is not to be hoped for: but Prof. Horsford, basing his argument on a fair interpretation of the records and a comparison of the physical conditions, has brought Leif Eriksen to the coast of Massachusetts as, beyond any reasonable doubt, the true Vinland.

The preparation of this volume, with its admirable illustrations and maps, many of them facsimiles, must have been a labor of love; and a more beautiful book it would be difficult to find.

The Final Results of the Triangulation of the New York State Survey, Together with a Description of the Methods Employed. Also, the Eleventh Annual Report of the Commissioners of the State Survey. Transmitted to the Legislature, March 22, 1887.

Albany, N. Y.: 1887.

The Report of the Commissioners briefly recounts the facts which brought about the representations made by the American Geographical Society, in 1875, and the consequent passage of the Act of April 29, 1876, for "making an accurate trigonometric and topographical survey of the State."

The primary triangulation is now completed for about two-thirds of the State. But little was added to the original appropriation of twenty thousand dollars, and it is at a trifling cost that the work has been performed which Major Powell, Director of the United States Geological Survey, declares to be excellent and admirable.

The Commissioners unanimously recommend the continuance of the survey under the supervision of a commission of five members, who shall serve without com-

pensation, and shall avail themselves, as far as practicable, of the assistance of the United States Coast and Geodetic Survey and the United States Geological Survey. The Director of the latter has proposed that the total cost of the work be divided between the State and the U. S. Geological Survey, an arrangement equally advantageous to both parties, since the triangulation already performed by the State Survey will facilitate and simplify the work on the Topographical Atlas of the country, so far as New York is concerned.

Besides the maps and illustrations in the text and appendices, the volume gives the following:

Map No. 1. Triangulation in Eastern and Central New York.

Map No. 2. Primary Triangulation in the State of New York.

Map No. 3. Triangulation of the Hudson River to Albany.

Map No. 4. Triangulation of the Hudson River, Albany to New Baltimore.

Map No. 5. Triangulation of the Hudson River, New Baltimore to Hudson.

The English in the West Indies, or, The Bow of Ulysses.—By James Anthony Froude.

New York, 1888.

Mr. Froude's book is partly a political pamphlet and partly notes of travel. The fitness of the sub-title may be clear to the author's mind; to the reader it is more than dim. The motto from Goethe is, on the contrary, significant, for it warns every one, at the outset, that

Mr. Froude looks on those who do not agree with him as enthusiasts, given to making and believing a lie.

The West Indies show, as in a mirror, the demoralized condition to which Ireland will be reduced if Home Rule prevails. This is the burden of Mr. Froude's political song. The islands are ruined, the blacks are making no advances in civilization, and the English power is merely a name.

Salvation lies in ruling the West Indies on the Indian system, that is, by the sword. The obvious difficulty in the case does not seem to disturb Mr. Froude. The blacks of the English West Indies are not a conquered people. They are free men, and most of them were born free, under the English flag. Legally, they are Englishmen. How is England to apply to such a people the military system by which she retains her hold on India? She cannot do it; but she must, according to Mr. Froude, or the blacks will continue to play at Home Rule and go to perdition, and the Irish will follow them, for the modern world is given up to the base instincts of Democracy, and the men that talk have taken the place of the men of action. This deplorable state of things is largely the work of orators, says Mr. Froude, and for the orators, from Demosthenes to Gladstone, he entertains very little respect; which seems to be a pity.

Even with Home Rule, however, the black "brothers-in-law" are declared to be the "most perfectly contented specimens of the human race to be found upon the planet." They are fast travelling, however, towards the savagery and cannibalism of Hayti, and nothing saves them, for the moment, but the presence of the English. This once withdrawn, chaos will come again.

Hayti itself Mr. Froude just looked at; but he had read Spencer St. John's book, and all that he could learn in the West Indies went to confirm Sir Spencer's disheartening statements.

Mr. Froude's own studies of the negro in Barbadoes, and Jamaica, and Trinidad are interesting and instructive. He has an eye for character and there is no gainsaying some of his conclusions. When he is willing to forget the bad example of Demosthenes and Gladstone, and is content to tell us what he saw, he is very entertaining. He has a great admiration for the men of the sixteenth century, and the laurels of Drake will not allow him to observe the proprieties. The sight of an English man-of-war on the way to Venezuela suggests to him what a good thing it would be to "pull Guzman's nose"; Guzman being Guzman Blanco, the President of Venezuela. When Drake said he would singe the Spanish King's beard, he was disrespectful to the mightiest monarch then living; but he was a man of action, and he went in person to do the singeing. Guzman Blanco is not Philip II., and Mr. Froude resembles Drake, with a difference.

The charm of his style and his evident sincerity may atone for some of Mr. Froude's shortcomings, but they do not always cover his inaccuracy.

In order to clinch an argument, he says that Spanish sugar goes free into the American market; but no one in the United States is aware of the fact.

On p. 340 we are told that "St. Domingo, or Española, of which Hayti is the largest division, was the earliest island discovered by Columbus, and the finest in the Caribbean Ocean."

Guanahani, the first island discovered by Columbus, and by him named San Salvador, has not been identified, but it was certainly not St. Domingo ; neither is Hayti the larger of the two republics in the island. Santo Domingo, the eastern division, has an area of about 20,000 square miles, and that of Hayti, the western division, is nearly 10,000.

For a scholar who was able to misinterpret with success so many of the documents in the Archives of Simancas, Mr. Froude is strangely weak in Spanish. He does not believe that the name Barbadoes is derived from the Spanish word, *Barbados*, which means simply *bearded*, and requires the addition of a substantive in order to make sense ; and it never occurs to him that there may be a Spanish noun, *barbado*. There is still some doubt as to the origin of the name, but the probabilities are in favor of the derivation given by Delitsch : " Barbados, so called from a tree (*Ficus barbata*) which sends down from its branches tufted shoots that take root ;" and the Spanish word *barbados* has, among its meanings, one which agrees fairly well with Delitsch's description : " The offshoots of a tree, which grow around it."

The word *morro*, which means a rounded hill, or eminence, Mr. Froude persistently spells *moro ;* as if a man were to write the *below* for the *bellow* of a bull.

Columbus masquerades, in a costume half-French, half-Spanish, as Christophe Colon ; and M. de Lesseps would hardly recognize his own great work under the name of the Darien Canal.

The book is brought out in handsome style, and the illustrations, from sketches by the author, are very good.

Haïti en 1886, par Paul Deléage.

Paris, 1887.

M. Deléage has much to say of Gen. Salomon's virtues — not the least of these being his marriage to a French wife—of the Haytian Bank, and of the polished tone that prevails in the debates of the Haytian Parliament; but in all his 400 pages there is nothing that throws light on the actual condition of Hayti; and his statistics can hardly be trusted.

The chief product of the republic is coffee, and we are told that 75,000,000 lbs. were exported in 1886, out of a crop of 100,000,000 lbs. Van Delden Laërne thinks the whole Haytian crop is below 60,000,000 lbs.

The *Almanach de Gotha* and the *Statesman's Year-Book* both put the exports of coffee for 1886 at 58,000,000 lbs.; and it may be doubted whether the available crop much exceeded this figure.

M. Deléage foresees a great future for the Haytians, who hold in their hands, he says, the keys of the Panama Canal.

This wholly unexpected revelation certainly relieves M. de Lesseps of some responsibility, and, at the same time, explains in a measure his present purpose of providing the Canal with locks; but why the keys should have been entrusted to the Haytians rather than to the Cubans, or the Jamaicans, there is nothing to show.

Like many travelled Frenchmen, M. Deléage is fond of using what he takes to be English words.

He landed, of course, upon a *warf*, and rode to his hotel in a *buss*. He found the people refreshing themselves with *cok's talls*, and he was, perhaps, under the influence of this pernicious beverage when he began his

seventh chapter with a quotation from "the Greek poet," Thucydides.

L'Inde Anglaise, Son État Actuel, Son Avenir. Précédée d'une Introduction sur l'Angleterre et la Russie par J. Barthélemy-Saint Hilaire.

Paris, 1887.

M. Barthélemy-Saint Hilaire does not concern himself with the origin of England's rule in India. He studies her work in the peninsula and her relations to its many different races, and he is brought to the conclusion that she deserves well of the world for the manner in which she meets her responsibilities. "Since the rebellion of 1857," he says, "England has undertaken and has unremittingly pursued the education of India, with a steadiness and a wisdom that call for full recognition * * *"

What is to be the outcome of this prodigious undertaking? How long a time, how many centuries, indeed, will it require for its accomplishment?

All that we can hope for is that England, so deeply impressed with the seriousness of her task, may not be disturbed in her equally worthy and gigantic enterprise, nor forced to abandon it by any complications of external policy. There is nothing to indicate that any one of the great nations could take her place to advantage, and continue to render to India the services now performed by this unhoped-for guardianship."

Duties of a like nature with those of England in India devolve upon the other European Powers in their colonies and protectorates, and the result of their combined action will be, M. Barthélemy-Saint-Hilaire considers, the ultimate, if remote, triumph of Christianity

throughout the world. He calls attention to the uninterrupted expansion of Christian dominion during the past four centuries, and to the steadiness with which the forces represented by Christianity press against the two or three bulwarks—China, India, Africa—which still resist.

To this practical statesman and accomplished scholar the work of Russia is not less important than that of England, and he looks forward to the apparently inevitable conflict between these Powers as to a calamity.

He does not agree with those who profess to discover symptoms of disintegration in the Russian Empire. He believes, on the contrary, that Russia possesses remarkable cohesive force and a national vitality equal to any strain.

Were the Toltecs an Historic Nationality? By Daniel G. Brinton, M. D. Philadelphia, 1887.

In this paper, read before the American Philosophical Society, Sept. 2, 1887, and now issued in pamphlet form, Dr. Brinton makes short work of the Toltec myth. He first restates the current opinion, as found in the works of most reputable writers, and then gives his own in the following words:

Tula was merely one of the towns built and occupied by that tribe of the Nahuas known as *Azteca* or *Mexica* whose tribal god was Huitzilopochtli, and who finally settled at Mexico-Tenochtitlan (the present city of Mexico); its inhabitants were called Toltecs, but there was never any such distinct tribe or nationality; they were merely the ancestors of this branch of the Azteca, and when Tula was destroyed by civil and foreign wars,

these survivors removed to the valley of Mexico, and became merged with their kindred; they enjoyed no supremacy, either in power or in the arts; and the Toltec "empire" is a baseless fable.

What gave them their singular fame in later legend was partly the tendency of the human mind to glorify the "good old times" and to merge ancestors into divinities, and especially the significance of the name Tula, "the Place of the Sun," leading to the confounding and identification of a half-forgotten legend with the ever-living light-and-darkness myth of the gods Quetzalcoatl and Tezcatlipoca."

The legend relates that the Azteca, or Mexica, —names applied to the same tribe,—after living for some generations in harmony, fell out and separated, at a time somewhere between the eighth and the eleventh centuries of our era. Dr. Brinton understands this to have been the separation of two "totems."

The followers of the tribal goddess Malinalxochitl entered at once the Valley of Mexico, while the followers of Huitzilopochtli passed on to the plain of Tula, and settled on the Coatepetl (the Serpent Mount or Snake-Hill), the central figure in all the wonderful stories about the Toltecs. Here they built houses and a temple to their god; and, after an indeterminate time, driven out by civil strife and war-like neighbors, they abandoned Tula and journeyed into the Valley of Mexico, there to found the famous city of that name.

The plain meaning of the narrative is, according to Dr. Brinton, that Tula was merely one of the stations occupied by the Aztecs in their migration, and that a

sound historical method can have nothing to do with Quetzalcoatl and the refined Toltecs.

To many sensitive souls this will be little less than flat burglary; but there is no help for it. Dr. Brinton is not the first and he will not be the last Americanist to shake his head at the Toltecs.

A Brief Narrative of the Journeys of David Thompson in North-Western America. By J. B. Tyrrell, Toronto, 1888.

David Thompson entered the service of the Hudson Bay Company in 1789, when he was 19 years old, and travelled over the great northern wilderness till 1814. For ten years after he was engaged on the Survey of the boundary between Canada and the United States, and in later life made special surveys in Canada. He died at Montreal, in extreme poverty, at the age of 87

Some of his field books and journals are preserved in the office of the Crown Land Department of Ontario, and from these Mr. Tyrrell gives a list of 82 positions determined in the region between the extremes of 90° and 117°, W. Long. and N. Lat. 45° to 58°. The extracts from the journal afford glimpses of a strange existence, that has passed away with the system under which it was developed.

TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS.

AARAU.—*Fernschau. Zweiter Band.*

Explorations in Central South America—Old Pottery of the Half-breed Indians of Paraguay—The Colonial Territories of Spain as Objective Points of Travel for Commercial Youth—

Aburi and Life on the Gold Coast — Terra Cotta Pottery in Roman Switzerland—Traditional Types of the House Ethnologically Studied—The Federal Initiative in the Matter Of a Central-European Customs-Union—The Photographic Museum of the Central-Swiss Commercial-Geographical Society at Aarau—On the Value of Decorative Style in Packing Goods for Market—On the So-called Universal Language, "Volapük."

BERLIN.—*Gesellschaft für Erdkunde: Zeitschrift.*

Studies of Columbus—Remarks on my Map of the Western Sûs, Nûn, and Tekena Region (by Quedenfeldt)—Dr. Karl Passavant (Memoir)—Maori Population in New Zealand, from the Census of 1886—The Sierra Nevada de Santa Marta and the Sierra de Perijá (Venezuela)—Some Myths of the Thlinkit—Adjabia and Henia (Tripoli).

Verhandlungen.

Navigation of the Kuango as far as the Kingunji Rapids, undertaken by Dr. Mense, in company with the Rev. R. Grenfell—Wissmann's Journey in Central Africa—Report on a Reconnoissance in the Peloponnesus—Dr. Meyer on His Ascent of Kilimanjaro—The Island of Fernando Po—Dr. Luschan's Travels in Asia Minor.

Deutsche Kolonialzeitung.

African Jurisprudence—The Gold Fields in Northern Matebele—England and Germany in East Africa—The Higher Schools of South Brazil—

England and South Africa — From German East Africa—Communications from the German E. African Plantation Company—German Vitu-land — Kaiser Wilhelmsland — Germans and Italians in South America—Prospects of Tropical Tobacco Culture—The Extra-European German Press — The Occupation of Quiloa by the Portuguese, 1500–1502 — The Imperial Subvention to the Mail Steamers for E. Africa — The Plantation of Kibueni (on Zanzibar Island)—Leave off Corrupting your Tongue!—Pictures of Zanzibar—The Water Question in South-west Africa — The Royal Festival at Leulumoengo (Samoa) —The Portuguese Viceroy Francisco d'Almeida and the Augsburg Merchants Balthasar Sprenger and Hans Mayr in 1505 in Kiloa—Pictures from Zanzibar — Colonial Political Sketches — East Africa—Land and People in Kiloa in 1505—Gold in South-west Africa.

BORDEAUX. — *Société de Géographie Commerciale, Bulletin.*

Expedition to Beledugu (in the French Sudan)—Voyage of the Gunboat *Niger* to Timbuktu, in 1887—Three Journeys of a Parisian Woman (Mme. de Ujfalvy) in Central Asia — The Delimitation of Portuguese Guinea—Cod-Fishery in Senegal.

BREMEN.—*Deutsche Geographische Blätter.*

The Planting of the Black Forest, and the Relations of its Forestry to Agriculture, Commerce and Industry—The Bourtange Moor (on the

Dutch-Hanoverian Frontier)—The Extension of Geographical Instruction to the Upper Classes in the Higher Institutes — Peary's Sledge-Journey on the Greenland Inland Ice, in 1886.

BRUSSELS.—*Société Royale Belge de Géographie: Bulletin.*

Notes on some Communes of Hainaut—Tomabamba, an ancient City of the Incas—Iron on the Congo.

Le Mouvement Géographique.

Exploration of the Ubangi—The Railway Expedition—The British East African Association—Tobacco on the Congo—The Stanley Expedition to the Succor of Emin Pasha—The Country of the Garenganzé—The Nicaragua Canal—The French at Timbuktu—The Problem of the Muta-Nzige—Lt. Wissmann's Observations in the Kassai Basin—The climate of the Kassai Basin—Rouvier's Maps of the Congo and the Kwilu—Decree Concerning the Traffic in Ardent Spirits on the Upper Congo—The Congo State and the Native Chiefs—The Flotilla on the Upper Congo—Exploration of the Chiloango and the Lukula—The Congo Company's Expeditions for Commercial and Industrial Aims—Manners and Customs.

BUENOS AIRES.—*Instituto Geográfico Argentino, Boletin.*

Exploration of the Rivers Gallegos, Colle, and Santa Cruz and the Channels of the Pacific, in Southern Patagonia.

COPENHAGEN.—*Geografisk Tidskrift.*

The Danish Expedition to Northern Greenland in 1886-87—Maigaard's Report of the Expedition under command of Civil Engineer R. E. Peary to the Greenland Inland Ice—Some Observations on the Inhabitants of East Greenland—On The Changes in the Forests of Denmark—Where is Columbus buried ?

EDINBURGH.—*Scottish Geographical Magazine.*

On the Height of the Land and the Depth of the Ocean—The Welle Problem—Burma : The New British Province—Across China ; from Bhamô to Shanghai—Pulo Condore—A Criticism of the Theory of Subsidence as Affecting Coral Reefs—New Guinea ; Attempted Ascent of Mt. Owen Stanley—Explorations in South America—The Welle Problem (Schweinfurth)—The Partition of Central Africa.

FLORENCE.—*Sezione Fiorentina della Società Africana d' Italia.*

The Orómo, or Gallas, of the Harar—The Colonial Problem.

GOTHA.—*Petermanns Mitteilungen, and Ergänzungsheft Nr. 88.*

The Island of Corfu—Preliminary Report on My Ascent of Kilimanjaro (Dr. Hans Meyer)—The first Separate Sheets of Berghaus's Physical Atlas—On the Anomalies of Temperature on the Surface of the Earth—On the Occurrence of Tin in the Islands of the Riouw-Lingga Archipelago (between Malacca and Banka)—Observations during my Last Jour-

ney in East Africa (by Pfeil)—The Basins of the Tubarão and the Ararangua (Santa Catharina, Brazil)—Astronomico-Geographical and Magnetical Determinations made in selected places in N. W. Russia and N. Germany in 1885, 1886 and 1887—Explanation of the name Congo—A Run in the West Australian Desert—The New Edition of Sydow's Atlases—Journey in the Interior of Santo Domingo—Influence of the Destruction of Forests on the Climate of Australia—Explorations of Bunge and Toll in Yana Land and the New Siberian Islands—On the Construction of Isotherms—Journey between Kassala and Setit—The recent Danish Investigations in Greenland, 1887—The Ratio of Precipitation in the Russian Empire—On the Circassians.

HAVRE.—*Société Commerciale de Géographie, Bulletin.*

Penal Colonization in New Caledonia—The Sources of the Orinoco—The Western Sahara.

LILLE.—*Société de Géographie, Bulletin.*

President's Address—Camille Douls; Journey across the Western Sahara and Southern Morocco.

LISBON.—*Sociedade de Geographia, Boletim.*

Report on the expeditions to Muzilla's territory (East Africa) in 1882—Contributions to the Cryptogamic Flora of N. Portugal (in French)—Portuguese Congo: Report on the Congo Factories, and Commerce, the Labors of Stanley and the English Missions.

LONDON.—*Nature.*

The Birds'-Nest on Elephant Island of the Mergui Archipelago, (Coast of Tenasserim).

Royal Geographical Society, Proceedings.

Explorations in British North Borneo, 1883–1887—Notes of a Journey from Domasi Mission Station, Mount Zomba to Lake Namaramba (E. Africa), August 1887—Indian Marine Survey, 1886–87—An Exploration of the Rio Dôce and its Northern Tributaries (Brazil)—Notes on Demâvend—Work of the Native Explorer M—H in Tibet and Nepal in 1885–86—Siam—Gen. Strachey's Lectures on Geography—Note on the Map of Lycia-Pamphylia.

LYONS.—*Société de Géographie, Bulletin.*

The Temple of Solomon—Explorations and Geographical Labors of the Missionaries.

MADRID.—*Sociedad Geográfica, Boletin.*

The Western Sahara—The French at Timbuktu—Railway from Riga to the Pacific—Catalan Chart of 1339—The Island of Paragua (Philippines)—Scientific and Geographical Work in Bolivia—Liberia—The Panama Canal in 1886.

MARSEILLES.—*Société de Géographie, Bulletin.*

Sydney, Nouméa and the Southern Bay—From Haiphong to Hanoi—Account of Samory (by Mahomed Sonfa)—Fifteen months among the Cannibals of Bangala—The Rangoon Pagoda.

MILAN.—*L'Esplorazione Commerciale.*

Keren and Sanhit—African Notes—Universal Colonial Statistics—The Province of Mendoza—

The Philippine Islands in Modern Times—Correspondence from Bengazi and Tripoli—Dedication of a Bust of Count Porro at Induno Olona—Help for Capt. Casati—Letters from Saati, Rome and Tripoli—Argentina, Uruguay and Paraguay.

MONTPELLIER.—*Société Languedocienne de Géographie, Bulletin.*

The Three Guianas: French, Dutch and English—The Eucalyptus—The Morocco Question.

NAPLES.—*Società Africana d'Italia.*

The War in Africa—The Kings of Abyssinia—From the Mediterranean to the Oceans—From Shoa—A Letter from Dr. Traversi.

NEW YORK.—*Science.*

Meyer's Ascent of the Kilima Ndjaro—The Peoples of South-eastern Europe—Explorations in the Dominion of Canada—Notes on the Geography of Labrador.

PARIS.—*Société de Géographie, Compte Rendu.*

Thouar's Expedition in the Northern Gran Chaco—Subterranean Waters at the Present Time and in Former Ages—A Voyage in the Mediterranean in 1783—The Latest Explorations by the Missionaries of the Sacred Heart in New Guinea—Meteorological Photographs taken at the Pic du Midi—Reception of Messrs. Bonvalot, Capus and Pépin, explorers of Central Asia and the Pamir—La Ceiba (in Honduras)—Hudson Bay—Kurdistan—Voyage of the Gunboat *Niger* to Korumé, the Port of Timbuktu—Report on the Tonkin Railroads

—The Trans-Siberian Railway—Geographical Distribution and Density of Population in France—The African Missions of François Coillard—Jacques Cartier: New Documents—The Railway Bridge over the Oxus—Krause's Journey in Africa—Scientific Researches in the Canaries—Words and Names in Senegambia—Geographical Notes on the White Nile, the Lower Niger, South-western Africa and Oceania—Death of General Perrier—Russian Explorations—South American News—Basque Ethnography—Oceanography—The Solomon Islands.

Bulletin.

A Mission to Shoa and the Galla Countries—Geographical Notice of the French Sudan—Second Scientific Voyage of the *Hirondelle* in the North Atlantic—Tonkin, the Upper Red River and its Affluents.

Revue Française et Exploration.

Armenia and Public Opinion—National Representation in Europe—The Afghan Frontiers—A German University (Bonn)—Exploration on the Zambezi.

Le Tour du Monde.

A Month in the Faroe Islands—Travels in Thessaly—Susa, 1884-1886—The Valley of Andorra.

Société de Géographie Commerciale, Bulletin.

The Faroe Islands and the Hebrides—Excursion in Annam—Republic of Uruguay—The Tunis Exhibition—Exportation of Manufactured Articles—The Ramie Plant in Tonkin—Spolia-

tion of the Kanakas in the Isle of Pines (near New Caledonia).

Revue de Géographie.

The Catalans—The Function of Forests and their Influence on Climate—Europe and Asia brought Face to Face, or First Outlines of a Colonial Policy in India, China and Indo-China—The Solomon Islands—Vancouver, the Terminus of the Canadian Pacific Railway.

ROME.—*Società Geografica Italiana, Bollettino.*

News from Shoa—The German Colonial Annexations in Africa and Oceania—Dr. Ragazzi's Journey from Entotto to Harar—News of Dr. Traversi—The Recent Collections of Dr. V. Ragazzi—Swedish Emigration—The Chopim River (Sta. Catharina, Brazil)—Prof. Umlauft's Work on the Alps—From Agram to Constantinople by Belgrade to Bucharest.

STUTTGART.—*Ausland.*

Among the Portuguese in Southwest Africa—Australian Statistics for 1886—Life in the Austrian *Almen* (high or mountain-meadows)—The People of Croatia and Slavonia—La Commanderia (Cyprus)—First Years of a Colonist in the Primeval Forest of South Brazil—Wild Cattle in England—The Gran Chaco—On the Goajira Indians—An Adventure in the Western Sahara—The Indian Population in North-western Peru—The Heathenism of the Tcheremisses (in Central Russia)—The Herring Catch—Emancipation in Brazil—The Black Republic of Liberia—The Hudson Bay

Company in Past Times and Present—An Excursion in Brittany—Leipzig's Wholesale Commerce and Industry—Marriage in Carniola—A Winter in the Orkneys—The Household among the Bulgarians—Athens—Massowah.

TURIN.—*Cosmos.*

Lake Palti or Yamdok Tso in Tibet—The Mayas: an Essay in American Ethnology and Linguistics—Ethnology of the Egyptian Sudan—Recent Danish Explorations in Greenland—The First Italian Mission to Morocco, Tangier to Fez (in 1875)—Travels of A. Perucca in Central Burma—Carey's Expedition to Chinese Turkestan and along the Northern Frontiers of Tibet.

VIENNA.—*Mittheilungen der K. K. Geographischen Gesellschaft.*

Contributions to the Physical Geography of the Congo—Observations on the Map of the Caravan Routes in the Region of Livingstone Falls on the Lower Congo—Petrographic Examination of Some of the Rocks collected on the Congo by Oscar Baumann—Subterranean Water Courses of Inner Carniola; the Basin of the Laibach—Kashmir, its Climate, Plant and Animal Life (Ganzenmüller)—The Destruction of the Seven Cities by the Araucanians (Polakowsky)—The Island of St. Andrea in Dalmatia (Rutar)—Recent Scientific Works on the Alps (E. Richter.)

Oesterreichische Monatsschrift für den Orient.

Voyages of the Austro-Hungarian Navy—England's Commerce with Inner Asia—China and Her Progress—The German Protectorates beyond Sea at the Beginning of 1888 — Sumatra in 1886—The Trans-Caspian Railroad—On the Inner Political Situation of Abyssinia.

Deutsche Rundschau für Geographie und Statistik.

West Australia—The Advances in Modern Trade Conditions — History of the Earth — The Whence and the Whither of the Present Geophysical State — The Basques — A Journey from Merv to Bokhara—The Economical Condition of the Cape Colony—A Contribution to the Appreciation of American Geographical Literature — From the Carpathians to the Narew River (in the Grodno Government, Russian Poland)—Carey's Journey in Eastern Turkestan and Northern Tibet, in 1885–1887 —The *Brunnen* and *Born* (in names of places) as Ethnographical Guides—Railroads of British India—The Gorge of the Tarn.

HENRY E. PIERREPONT

BORN, AUGUST 8, 1808.
DIED, MARCH 28, 1888.

Mr. Pierrepont was one of the founders of the American Geographical and Statistical Society, and for the ten years from 1852 to 1862 a member of its Council.

Actively engaged as he was in business, and with constant demands upon his time from the many philanthropic and religious associations of which he was a conscientious and earnest member, he never failed to attend the meetings of this Society and to manifest by word and deed his interest in its welfare.

It is not given to many men to leave a record of such long-sustained and blameless service as his, equally precious to the few survivors of those who stood with him in the day of small things, and to the later generation that has taken up the good work.

At a meeting of the American Geographical Society held March 29, 1888, the following Resolutions were unanimously adopted:

Resolved, That in the death of Henry E. Pierrepont, one of the Founders of this Society, and for ten years, from 1852 to 1862, a Member of its Council, the American Geographical Society has met with an irreparable loss. When there was little but the sense of duty to bring its members together, Mr. Pierrepont, whatever might be the inclemency of the weather, or the other seeming obstacles in the way, travelled from his distant home to take part in the work of the Society. The interest, thus manifested in the early days, he continued to show to the end of his unsullied life.

Resolved, That this Society sympathizes profoundly with the afflicted family of the deceased, and that a copy of these resolutions be transmitted to them by the Secretary.

JOSEPH W. DREXEL

BORN JANUARY 18, 1830.
DIED, MARCH 25, 1888.

Mr. Drexel became a Fellow of the American Geographical Society in 1876, and a member of its Council in 1883. A man of large and liberal culture and especially devoted to music, in which his acquirements were unusually extensive and solid, he was drawn by a natural sympathy towards all organizations for the advancement of science and of art. To these he gave freely of the means which an ample fortune placed at his disposal, and not less readily of his time and his personal services.

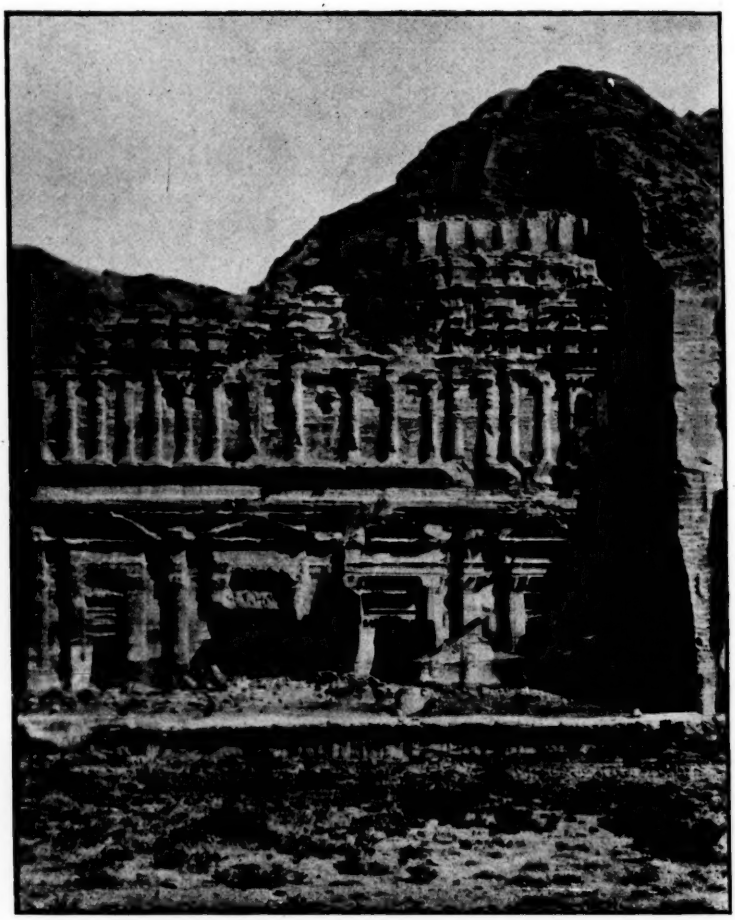
Not to speak of his charities would be to wrong his memory.

He was not only ready to respond to an appeal; he sought out those who stood in need, and endeavored so to aid them that they might regain their energy, and take up their own burdens. These things he did without weariness and without ostentation, living with serenity and with earnestness a well-spent life.

At a meeting of the American Geographical Society held March 29, 1888, the following Resolutions were unanimously adopted:

Resolved, That in the death of Joseph W. Drexel, a Fellow of this Society since 1876, and for the past five years a member of its Council, the American Geographical Society has sustained a loss not easily repaired. His association with the aims and objects of the Society was a natural outcome of the intelligence and liberal culture as well as of the genuine and active benevolence and humanity, which made him a centre of good influences in the community.

Resolved, That this Society extends its heartfelt sympathy to the afflicted family of the deceased, and that a copy of these Resolutions be transmitted to them by the Secretary.



TEMPLE WITH THREE TIERS OF COLUMNS.